The IRON AGE

February 20, 1958 A Chilton Publication The National Metalworking Weekly

U. S. Industries' John Snyder

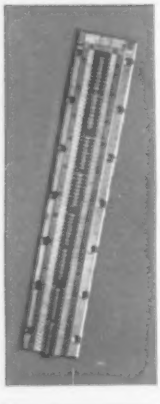
How To Survive In a Competitive Market P. 43

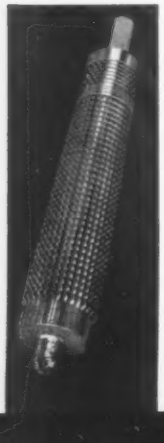
The High Cost Of Inventory Runout – P. 48

Hold Tolerances To Sensible Limits – P. 83

Digest of the Week P. 2-3

The unusually large broach produced for a heavy equipment builder is given careful final inspection by Continental Tool engineers before shipment.





Ever seen a broach this big before?

HERE'S HOW IT WAS MADE—AND WHY

It takes a large tool to broach accurate involute splines in an 8.040" diameter by 4.750" long hole in one pass in a steel part.

Yet that's exactly what the mammoth broach shown above is doing today for a major producer of heavy earth-moving equipment. Its size alone — 8½-plus diameter by 74" length—makes it one of the largest of its kind ever produced by Ex-Cell-O's Continental Tool Works. To make it, required a series of critical manufacturing operations highlighted by the hardening process applied to the shell main body.

One more example of how Continental engineers, plant personnel and facilities team to deliver broaches tailored to meet manufacturers' requirements. Perhaps you have a specific problem you'd like to discuss with them. Simply call your local Ex-Cell-O representative—the service costs you nothing, of course.

Continental

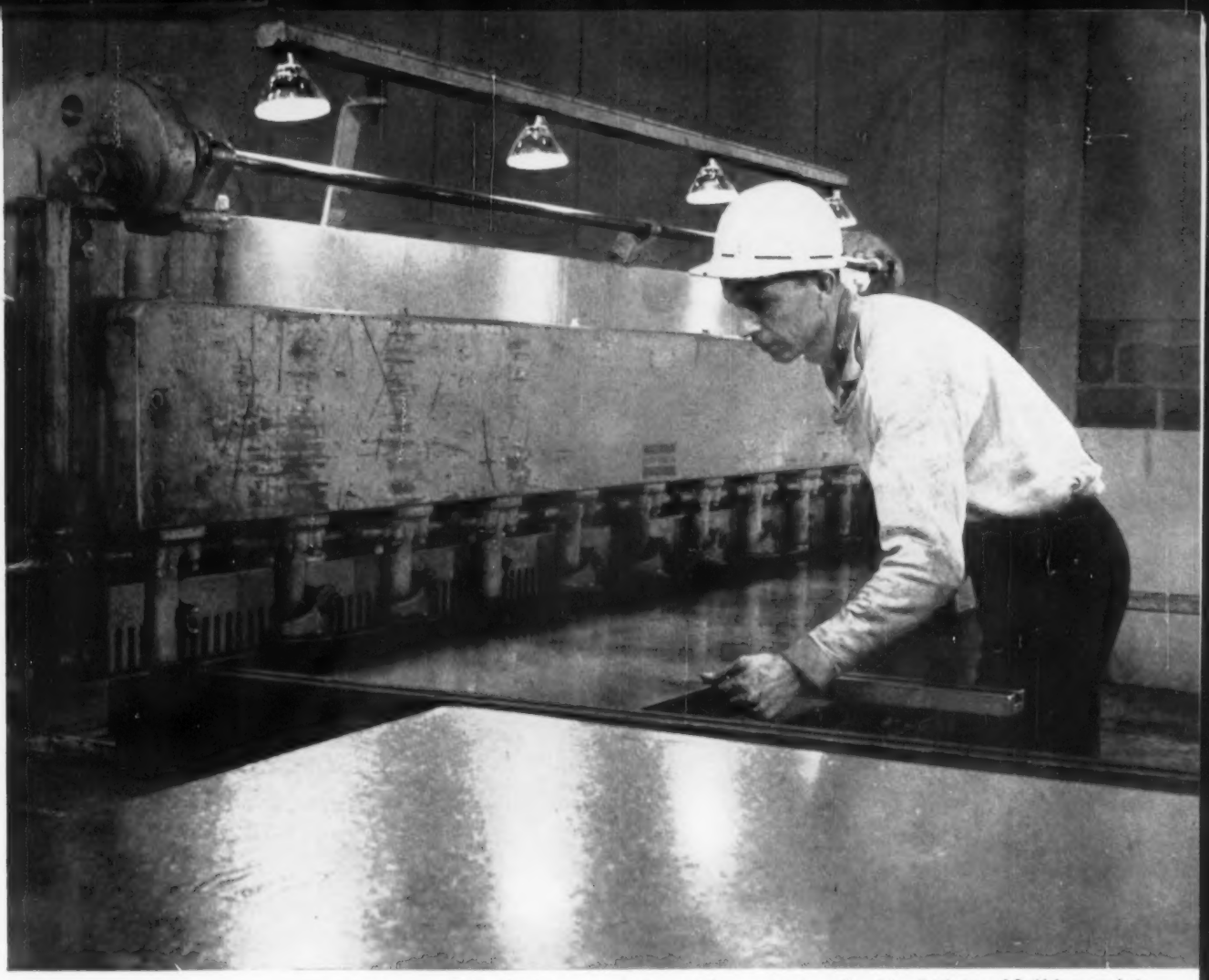
CTW

TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

57-69



Cutting sheets to proper size is one of the many services offered by distributors of Bethlehem products.

"TWENTY-FOUR HOURS," *the Distributor Promised*

Down in Crisfield, Md., Charles D. Briddell, Inc., is well known to the crabbing industry for the excellent machinery it builds. Recently the shop was working at top speed to turn out a crab-picking machine for a good customer. A steel angle of special size was needed to complete the job—and because of unusual circumstances, the shop didn't have one immediately available.

Charles Briddell, president of the company, phoned a Baltimore steel-products distributor. Quickly he explained his situation. "We'll have you fixed up in 24 hours," the distributor promised.

Keeping that promise was important. Minutes after the call had been completed, the distributor was cutting a sheet to size. Then he rushed it to a local fabricator, who agreed to form the angle without delay. That afternoon the piece was on its way to Crisfield.

Charles Briddell received it the following morning. His comment: "Perfect timing. That's what I call *service!*"

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Indexed in the Industrial Arts Index and the Engineering Index.

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THE IRON AGE, published every Thursday by CHILTON COMPANY, Chestnut & 56th Sts., Philadelphia 39, Pa. Entered as second class matter, Nov. 8, 1932, at the Post Office at Philadelphia under the Act of March 3, 1879. Price to the metal-working industries only or to people actively engaged therein, $5 for 1 year, $8 for 2 years in the United States, its territories and Canada. All others $15 for 1 year; other Western Hemisphere Countries, $25; other Foreign Countries, $35 per year. Single Copies 50¢. Annual Review Issue $2.00. Cable: "Ironage," N. Y.

The IRON AGE

February 20, 1958—Vol. 181, No. 8

Digest of the Week in

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NEW WORLD TRADE

Exporting Knowledge — A new kind of world trade is thriving in the marketing of industrial knowledge and patents. It's a two-way street, with U. S. firms both buying and selling their processes and patents. P. 50

BRIGHT NUMBERS

They Glow—Westinghouse Research Laboratories has developed a new technique to display figures on a compact, glowing, electroluminescent screen. It has many possibilities. P. 51

UAW's SUPREME COURT

Off to Good Start—It's less than a year old, but the auto union's Public Review Board already has some weighty decisions under its belt. In guarding members' rights it also aids management. P. 60

WASHINGTON OUTLOOK

Be Patient — FRB's Martin is confident of an early end to the current recession. But he is still worried about inflation, warns

Metalworking

SURVIVAL: John Snyder, president and chairman of U. S. Industries, Inc., outlines some sound rules for keeping ahead of competition in a tough, competitive market. It takes more than effort to survive when customers become fewer. P. 43

against too much meddling with the economy. P. 65

ARIZONA STEEL MILL?

State's Steel Needs Rise—Arizona consumes a quarter million tons of rolled steel products a year—brought in from the outside. A local mill for production of bars and shapes would be welcomed by the area's steel users. P. 67

FEATURE ARTICLES

TOLERANCES

The Sensible Approach — Two and two don't always add up to four. Quality control men are proving it, and showing that many of today's tolerances are completely unrealistic. They've come up with a sensible way to set up tolerances. P. 83

BARREL FINISHING

Vibrations Cut Time—A new barrel finishing machine combines horizontal rotation with 2300 endwise vibrations per minute. Where jet blades used to take 40 hours, they need only 16 hours when jiggled and vibrated at the same time. P. 86

MISSILE HARDWARE

Automotive Skills Do Job—An automotive firm has learned how to handle tolerances in millionths of an inch. Further, it has hung up a production record while cutting costs on one of the most complex pieces of hardware used in ballistic missiles, the inertial guidance system. P. 88

PROGRAM ROLLING MILL

With Punch Cards—The press of a single button starts a roughing reversing mill through a complete rolling cycle. A new card programming system controls the steps for each given slab. P. 92

METALLOGRAPHY

Solves Machining Problem—Just two pieces of equipment, a microscope and a hardness tester, solved a difficult drilling problem in tough valve-guide castings for aircraft engines. P. 96

MARKETS & PRICES

FREIGHT CARS

Builders Are Glum—The industry had a good year in 1957, thanks to heavy backlogs. But 1958 is a different story. A 56,000-car backlog on Jan. 1 may be far less today as big roads cancel orders. P. 46

WROUGHT IRON

A Step Forward—A new wrought iron with about 20 pct greater corrosion resistance is announced by A. M. Byers Co. It will sell at price of standard wrought iron. P. 47

BARGAIN TOOLS

Market Possibility—Extreme accuracy of numerical controls is not always needed. There may be a market for less expensive numerically controlled tools that do not perform over "commercial" tolerances. P. 69

PRICE PRESSURE

Customers Want Concessions—Some steel users are pressuring the mills for price cuts. But they aren't getting anywhere. The mills are holding firm. P. 125

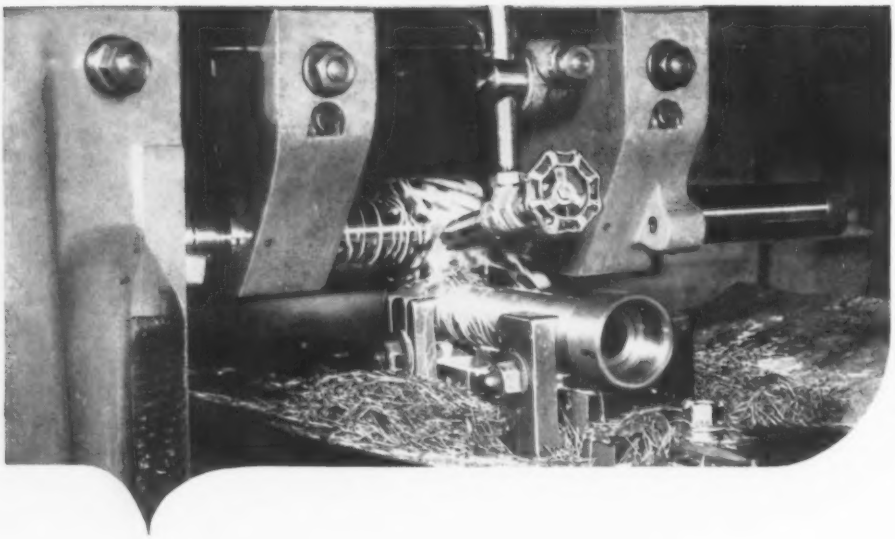
TOOL AND DIE SALES

An Increase Expected — This quarter should see an improvement in the tool and die business, manufacturers believe. However, even an expected boost of 10 to 20 pct would still leave the industry below 1957 levels. P. 126

NEXT WEEK

ALUMINUM

Aggressive Marketing—It's not a new story to aluminum makers—too much capacity with more on the way. Next week's Special Report tells how the problem is being met with a brand of marketing that could greatly affect the industry.



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Don't Give Up Now!
There's Lots of Fun Ahead

The hue and cry for the government to "do something" about business is becoming more insistent. This election year will put on the pressure.

But let's reflect: The government is you and I. What we can't do ourselves can't be done better by "all of us." Political "urgency," top heavy bureaucracy and "everyone in the act" spell trouble. If not now, then later.

But even this preparation for grandiose schemes to spend money we don't have is no reason to line up at the wailing wall. Many of us have frozen in our tracks. We are afraid to live. We shrink from gambling on a sure thing and we fail to face up to the fact that our emotions often rule us in our business.

Many firms do have too much stock. Others have overextended themselves. Many must cut cloth until it hurts. Excesses of the past are leveling off the business peak. It may be quite true that this is the time for a correction in order to prevent a bigger dip later on.

But does all this mean we must think constantly in an indigo blue color? Must we give up? Must we crawl into a hole, pulling the cover over us? Hardly, if we want to go on living and trying to do a good long-term job.

If we need materials we should buy them. If we need new machinery to cut costs we should order it now: It won't be any cheaper in the future; it will cost more. It will not help us to postpone the things we know must be done now.

Of course we need to trim out the deadwood. But we don't have to cut live wood out too. We need that for the future.

There is nothing in the present picture to suggest a 1930-type depression. The basic strength is there. The end is not coming for industrial growth and diversification.

But what if we do run into a depression? Would that be the end of everything? Material things can be recouped, hysteria can be cured, people can start over and the world will go along as it has for thousands of years.

But we don't face the prospect of a deep recession or depression. We are on our way to greater challenges. But we can't meet them if we react as if lightning were going to strike us any minute.

Self discipline can be fun—while it produces growth.

Tom Campbell

Editor-in-Chief

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BELOIT, WISCONSIN

Rating Execs

Sir—Please send a copy of the Survey Report to Management article "How to Rate Executives" from your Jan. 30 issue.

It takes a realistic approach to rating programs and has been read here with considerable interest. The charts being discussed by Messrs. Gieffers and Nemic on p. 67 are evidently individual rating charts or performance charts of some nature and are very interesting from what we can see.—R. G. Scoggins, Mgr., Hot Rolled Bar & Shape Products, Jones & Laughlin Steel Corp., Pittsburgh.

Sir—If still available I would appreciate six reprints of the Survey Report in your Jan. 30 issue. In my opinion it is among the better articles I have read on rating programs. I would like to send copies of it to my fellow executives.—L. L. Payne, Asst. Vice Pres., Engineering, Hughes Tool Co., Houston.

Sir—I always find your special survey reports stimulating and thought provoking. The latest on how to rate executives impressed me very much. It will help me in evaluating our own executive rating program.—A. R. Foley, Detroit.

Sir—We were quite impressed with the article "How to Rate Executives" which appeared in a recent issue of The IRON AGE. If possible we would like to have twenty copies for use within our organization—F. C. Jones, Vice Pres., Handy & Harman, New York.

▪ Copies are on the way to all the above.—Ed.

Stretcher Strains

Sir — In your very interesting article "Boron Rids Steels of Stretcher Strains" in the Aug. 8 issue of The IRON AGE you are writing about a method for the determination of oxygen, which has been developed by research-chemists at Jones & Laughlin.

We should be pleased to receive further particulars about this method for the determination of oxygen and therefore we are writing to you and hope, that you will be able to give us this information. SKF, Hellefors Jernverk, Sweden.

▪ Further information should be requested from Research Laboratory, Jones & Laughlin Steel Corp., Pittsburgh.—Ed.

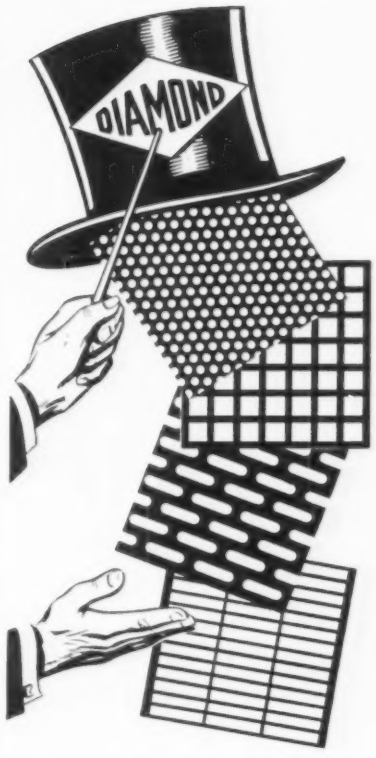
3-D Drawings

Sir—In your Jan. 9 issue you report a new drafting machine which promises to simplify the tough job of producing those increasingly popular three dimensional drawings. The machine needs only a plan and an elevation drawing and a draftsman of moderate ability to do these jobs in ⅓ to 1/7 of the time now required.

Can you tell us where this machine can be purchased?—R. F. Herr, Sr., The Herr Equipment Corp., Warren, O.

▪ The machine is manufactured and marketed by Autoperspective, Ltd., 5 Victoria St., London, S.W. 1, England.—Ed.

"This is the boss's son. He's going to start at the bottom—for a few days."



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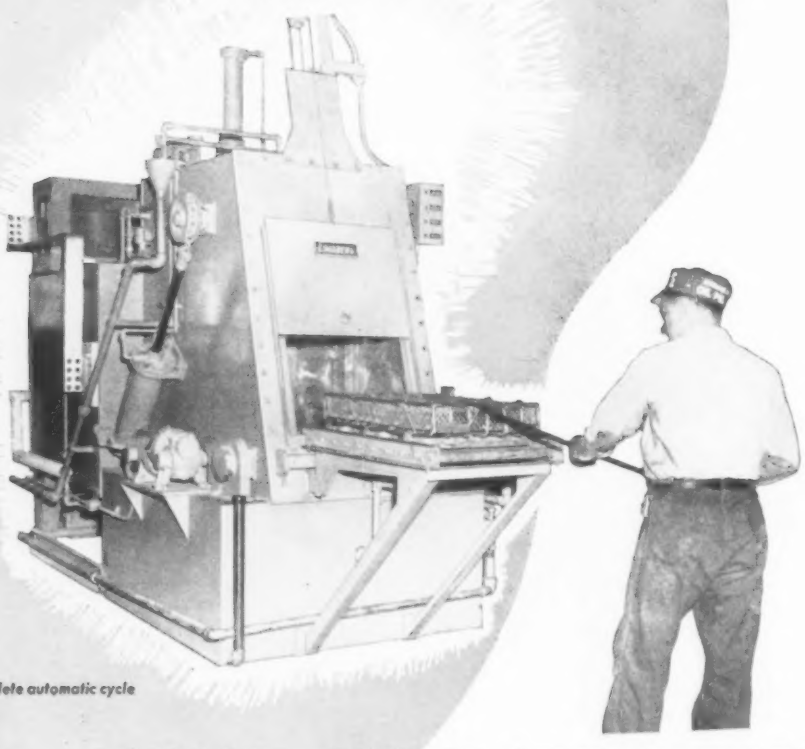
Here's the work-horse

for many a carbonitriding job



This furnace has complete automatic cycle and quench control.

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LINDBERG

heat for industry

Moving Experience

There was an excellent example of practicing what you preach at Hytrol Conveyor Co. of Milwaukee recently. The firm—which manufactures a line of conveyors for industrial and commercial materials handling—had an employe lunch-

con on its 10th anniversary.

What would be better, they felt, than a conveyorized feast (see photo). The idea turned out so well that H. T. Loberg, the firm's president, reports the conveyor system will be used at future sales staff meetings around the country.

Research Capers

The argument as to whether research is basic or applied is interminable. Some cynical industrialists are inclined to adopt the definition of basic research as something you do where you don't expect to make any money out of it. More accurately, it might be called research without an immediate commercial objective. (U. S. Steel's Dr. J. B. Austin).

Hobnobbing with some scientists the other day, our man picked up two new definitions which you may wish to try on for size. Applied research, said one practical scientist, is the study of something where we need the answer in less than six months.

Another put it this way: "Basic research is what I'm doing; applied is what the other fellow is doing." He added that this can also be phrased just the other way, depending upon whether the researcher is talking to a fellow scientist (the form above) or to the treasurer of the company (vice versa).

Hitting the Road

Some interesting mileage checks on cars used by salesmen were made by Emkay, Inc. of Chicago which leases 3100 cars nationally, about 400 of them to metals industry salesmen. The figures show the average salesman was on the road over 400 more miles in December than he was in June.

Puzzlers

E. L. Sweet, Standard Gage Co., Poughkeepsie, N. Y.; Rose Lantos, Industrial Welding Co., Newark, N. J.; Dick Hautzenroeder, Detroit, Mich.; Arthur B. Retallick, N.Y.C.; Ray W. Marshall, Lukens Steel Co., Coatesville, Pa.; Jim Mull, the North American Manufacturing Co., Cleveland, Ohio; Lt. James Chorak, Curtiss-Wright Corp., Caldwell, N. J.; A. H. Leader, Taylor Instrument, Rochester, N. Y. (thanks for the new puzzler, but we've used it all up, already); Leon J. Bercutt, American Compressed Steel, Kansas City, Mo.; A. D. Kattele, American Brake Shoe, N.Y.C.; Gilbert King, NRC Equipment Corp., Newton Highlands, Mass. (thanks for the new puzzler, but we've used it all up, already); Harry Ross, Ipsenlab of Rockford, Inc., Rockford, Ill.; C. P. del Cano, I.B.M., Awego, N. Y.; W. H. Fitzgerald, Bethlehem Steel, Bethlehem, Pa.; Mel Harvey, Ford Motor Co., Louisville, Ky.; M. S. Dushlek, Washington, D. C., and R. W. Leary, Leeds & Northrup, Phila., Pa. all maintain that "A" was wearing a black hat. We maintain same.

Atlas

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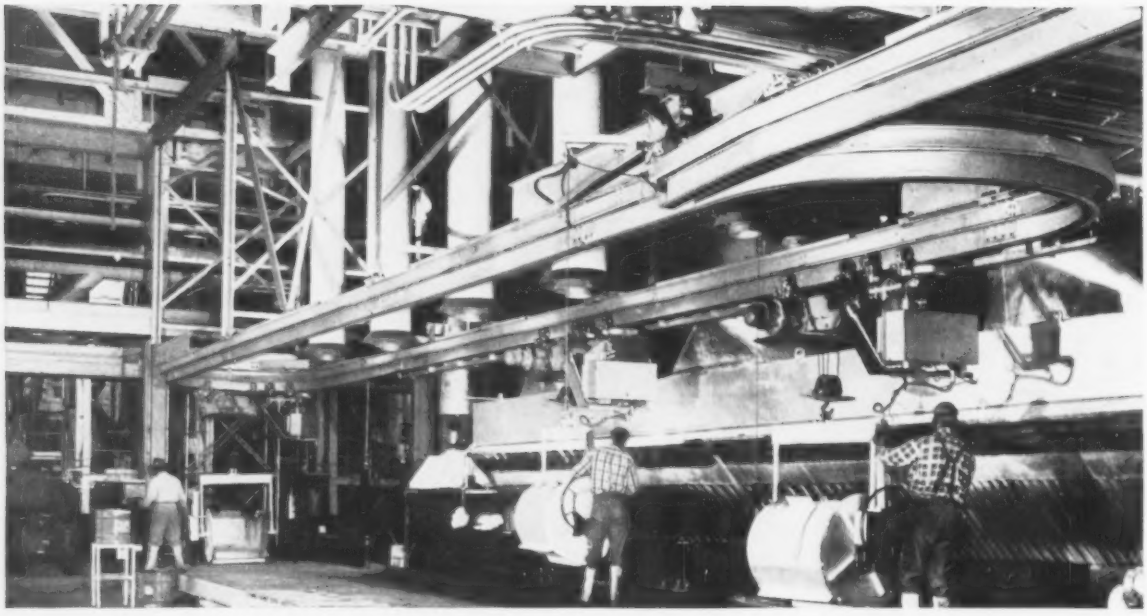
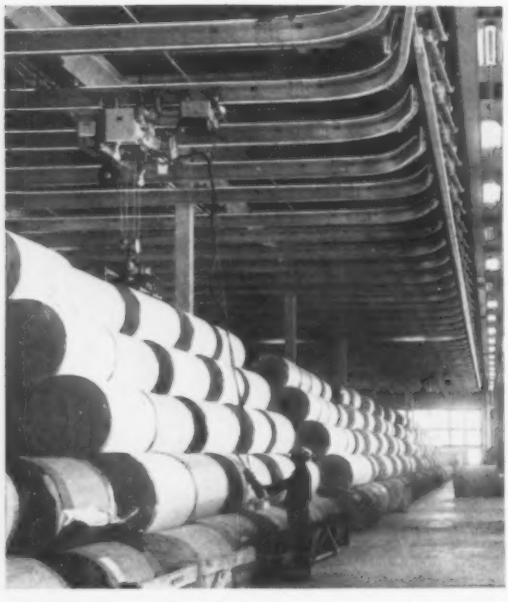


Here's a way to make your lost ceiling space pay off

AMERICAN MONORAIL



Floor space is unobstructed, free of traffic with American MonoRail overhead handling.

increases plant capacity...
cuts handling costs...
reduces worker fatigue...
minimizes damage and loss.

You can get more profit out of your plant. American MonoRail Engineers can show you how to convert lost ceiling space – eliminate obstructive storage around machines – and gain additional operating area. Find out how you can process work in motion, cut down idle time, and assure safe handling of product. Work can be done at comfortable heights – worker fatigue lessened – heavy loads eliminated – and damage to product reduced.

Let American MonoRail Engineers plan your handling. Write for full information today.

AMERICAN MONORAIL

ENGINEERED MATERIALS HANDLING

13103 ATHENS AVENUE
CLEVELAND 7, OHIO

OVERHEAD HANDLING EQUIPMENT

MEMBER OF MATERIALS HANDLING INSTITUTE AND MONORAIL MANUFACTURERS ASSOCIATION

COMING EXHIBITS

AtomFair '58—March 17-21, International Amphitheatre, Chicago. (International Atomic Exposition, Architects Bldg., Phila. 3.)

Packaging Machinery and Materials Show—March 25-28, Convention Hall, Atlantic City, N. J. (Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22.)

Industrial Development Show—Apr. 7-11, Coliseum, New York. (Woods, Donegan & Co., Inc., 48 West 48th St., New York 36.)

Design Engineering Show — April 14-17, International Amphitheatre, Chicago. (Clapp & Poliak, 341 Madison Ave., New York 17.)

Welding Show—Apr. 14-18, Kiel Auditorium, St. Louis. (Banner & Greif, 369 Lexington Ave., New York 17.)

Tool Engineers Show—May 1-8, Convention Hall, Philadelphia. (American Society of Tool Engineers, 10700 Puritan Ave., Detroit 38.)

MEETINGS

FEBRUARY

Assn. of Iron & Steel Engineers—Western meeting, Feb. 24-26, Hotel Statler, Los Angeles. Society headquarters, 1010 Empire Bldg., Pittsburgh.

MARCH

Can Manufacturers Institute, Inc.—Annual meeting, Mar. 3, Waldorf-Astoria Hotel, New York. Society headquarters, 1413 K St., N. W., Washington.

American Machine Tool Distributors' Assn.—Spring meeting, March

(Continued on P. 16)

When you need 52100 steel bars and tubes go direct to Peterson....world's largest stocks. NOTE: For better machineability specify *leaded* bars.

52100

ONE WAY

PETERSON

STEELS, INC.

Union, New Jersey • Detroit, Michigan • Chicago, Illinois

In the gleaming world of stainless steel there is no better source for polished finishes than Eastern, home of the largest stainless steel polishing department on the globe. Backed by years of experience, technological skill and unmatched facilities, Eastern guarantees mill-polished sheets that will meet your specifications for uniformity and quality at a minimum cost.

ES

Eastern Stainless Steel Corporation • Baltimore 3, Maryland, U.S.A.

Illustrated is a Lucas Horizontal Boring Machine equipped with a Gusher Coolant Pump tank unit.

with Ruthman GUSHER Coolant Pumps

Your Gusher Coolant Pumps are precision built of the best materials, electronically balanced for efficient operation. You get split-second coolant flow, there is no priming needed. Pre-lubricated ball-bearings, no pump packing, no foot or relief valves necessary, cut maintenance to a minimum. Write for catalog today.

THE Ruthman MACHINERY CO.

• COOLANT PUMPS
• CIRCULATORS • AGITATORS
• MOLTEN METAL PUMPS

1809-1823 READING ROAD, CINCINNATI 2, OHIO

EXHIBITS, MEETINGS

(Continued from P. 13)

10-11, The Roosevelt, New Orleans, La. Society headquarters, 1900 Arch St., Philadelphia, 3.

Pressed Metal Institute — Spring technical meeting, Mar. 12-14, Sheraton - Cadillac Hotel, Detroit. Society headquarters, 3673 Lee Rd., Cleveland 20.

National Assn. of Waste Material Dealers, Inc.—Annual convention Mar. 15-18, Waldorf-Astoria, New York City. Society headquarters, 271 Madison Ave., New York.

Steel Founders' Society of America —Annual meeting, Mar. 17-18 Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland 13.

National Assn. of Corrosion Engineers—Annual conference and exhibition, Mar. 17-21, Civic Auditorium, San Francisco. Society headquarters, 1061 M&M Bldg., Houston.

International Acetylene Assn.—Annual spring convention, Mar. 19-21, The Bellevue-Stratford Hotel, Philadelphia. Society headquarters, 205 E. 42nd St., New York.

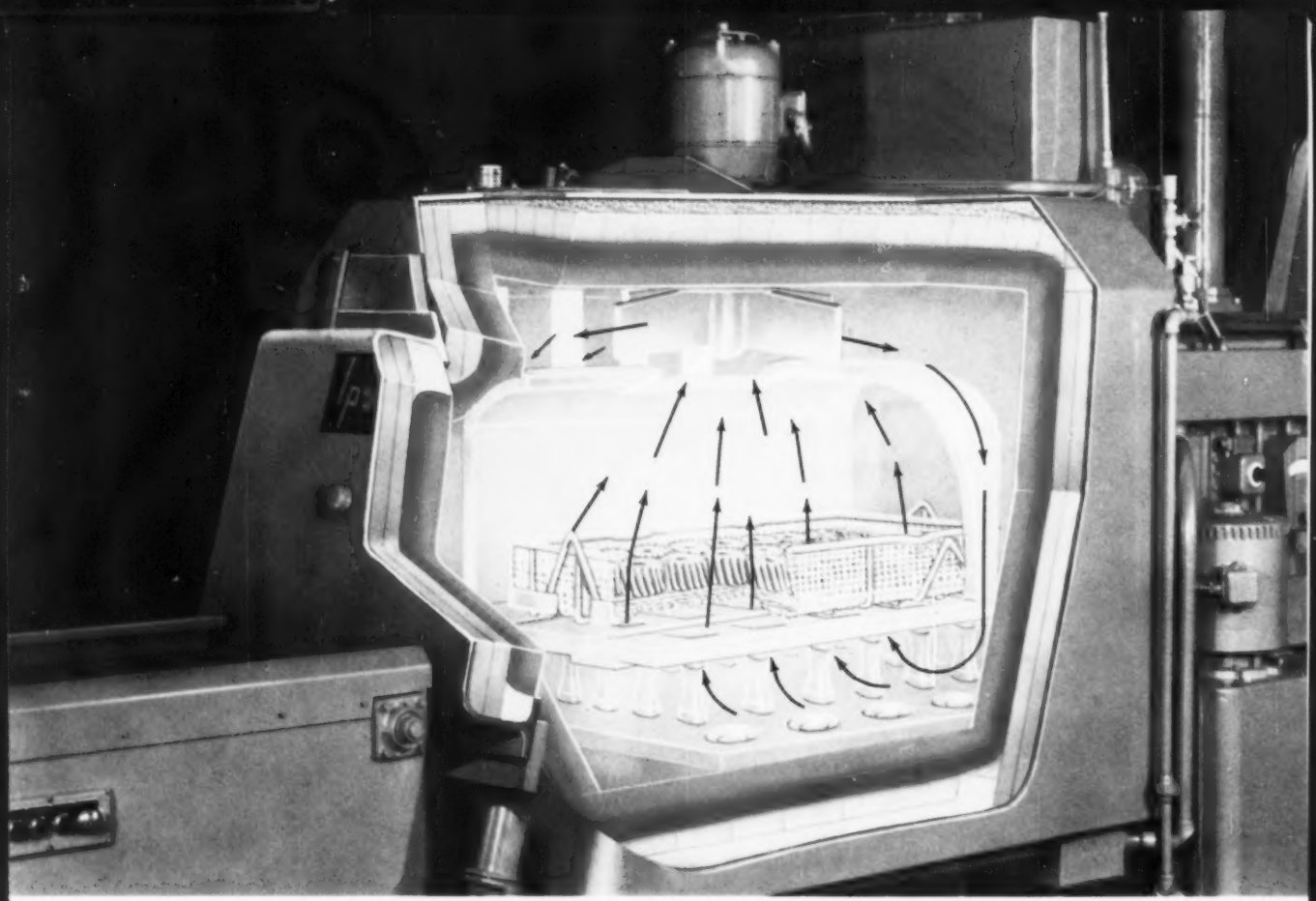
American Hot Dip Galvanizers Assn., Inc.—Annual meeting, Mar. 27-28, Penn Sheraton Hotel, Pittsburgh. Society headquarters, 1806 First National Bank Bldg., Pittsburgh.

APRIL

Concrete Reinforcing Steel Institute —Annual meeting, Apr. 6-12, The Boca Raton Hotel, Boca Raton, Fla. Society headquarters, 39 S. Dearborn St., Chicago.

Wire Reinforcement Institute, Inc. —Annual spring meeting, Apr. 7-8, Hotel Boca Raton, Boca Raton, Fla. Society headquarters, National Press Bldg., Washington.

Industrial Fasteners Institute—Annual meeting, Apr. 8-10, Boca Raton Hotel, Boca Raton, Fla. Society headquarters, 1517 Terminal Tower, Cleveland.



Superior controlled atmosphere heat treating

. . . with Ipsen 100% forced convection

100% forced convection heating and exclusive alloyed ceramic heating tubes have been successfully combined in all Ipsen furnaces for special atmosphere carburizing, carbo-nitriding, heat treating, brazing or sintering, and other applications calling for temperatures up to 2500° F.

Here's what happens when a cold charge goes into an Ipsen furnace. Stored heat from the furnace walls is forced into the heating chamber to the work being heated. This causes the furnace temperature to fall until the furnace wall, the heating chamber, and the charge all reach the same temperature. Then the high velocity heat which is carried to every part of the heating chamber and the charge simultaneously raises the temperature of both the heating chamber and charge back to the desired control temperature.

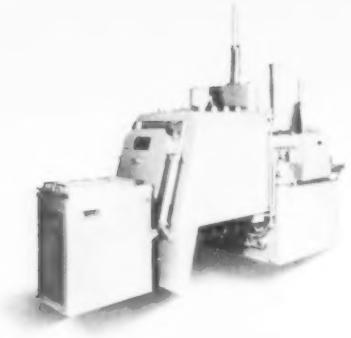
100% forced convection heating insures *uniform heating of every part of the charge* . . . whether it's loosely or densely packed. Both light and heavy sections are uniformly heated.

Ask for literature describing Ipsen 100% forced convection furnaces.

AUTOMATIC Ipsen HEAT TREATING UNITS

following page shows 100% forced convection chart

how Ipsen 100% forced convection works . . .



This centrifugal roof fan, powered by a husky, slow-starting motor, circulates the protective atmosphere . . .

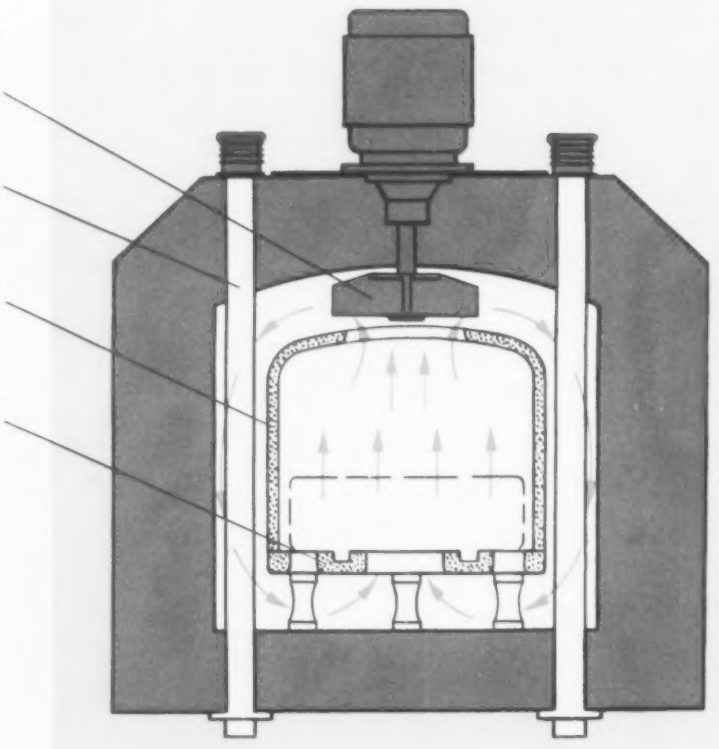
down past these vertical alloyed ceramic heating tubes . . .

which are isolated from the work chamber by this baffle . . .

to the bottom of the furnace and then up through this heavy, open grid-hearth . . .

to all parts of the charge where correct working temperature is maintained.

Work is brought to heat uniformly . . . controlled atmosphere is forced to all parts of the charge.



Write for technical brochures describing Ipsen 100% forced convection furnaces

AUTOMATIC Ipsen HEAT TREATING UNITS

IPSEN INDUSTRIES, INC. • 723 S. MAIN STREET • ROCKFORD, ILLINOIS

Automation has raised productivity to new high levels

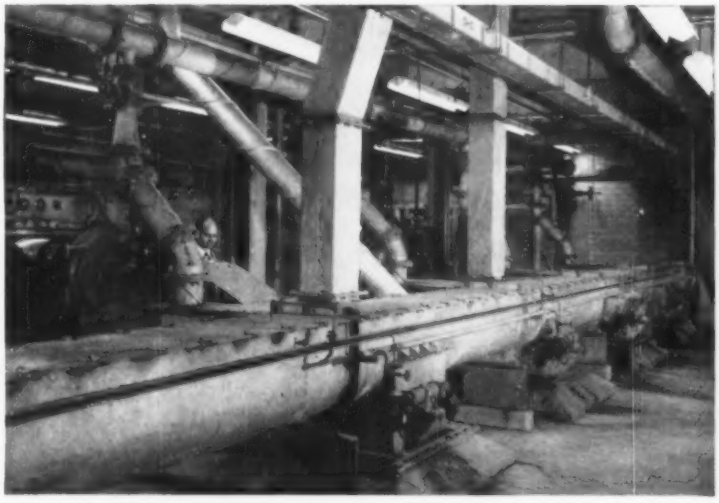
JEFFREY
Spiral Conveyors are important in moving materials

THE HIGH DEGREE of automation has raised productivity per man to new high levels in many plants throughout industry. Transfer of materials is largely under automatic control, for example, as evidenced by these Jeffrey spiral conveyor systems.

Jeffrey spiral conveyors offer an economical means of handling dry, loose bulk materials. Compact, they occupy a minimum of space. Convenient, they can be fed or discharged at any point along their length. Jeffrey makes them in open and dust-tight styles, of metals to suit particular requirements.

Jeffrey engineers will assist in selecting conveyors to meet your handling needs. Catalog 851 describes spiral conveyors. The Jeffrey Manufacturing Company, 925 North Fourth Street, Columbus 16, Ohio.

Paper stock in a paper mill is automatically moved from one operation to another by spiral conveyors.

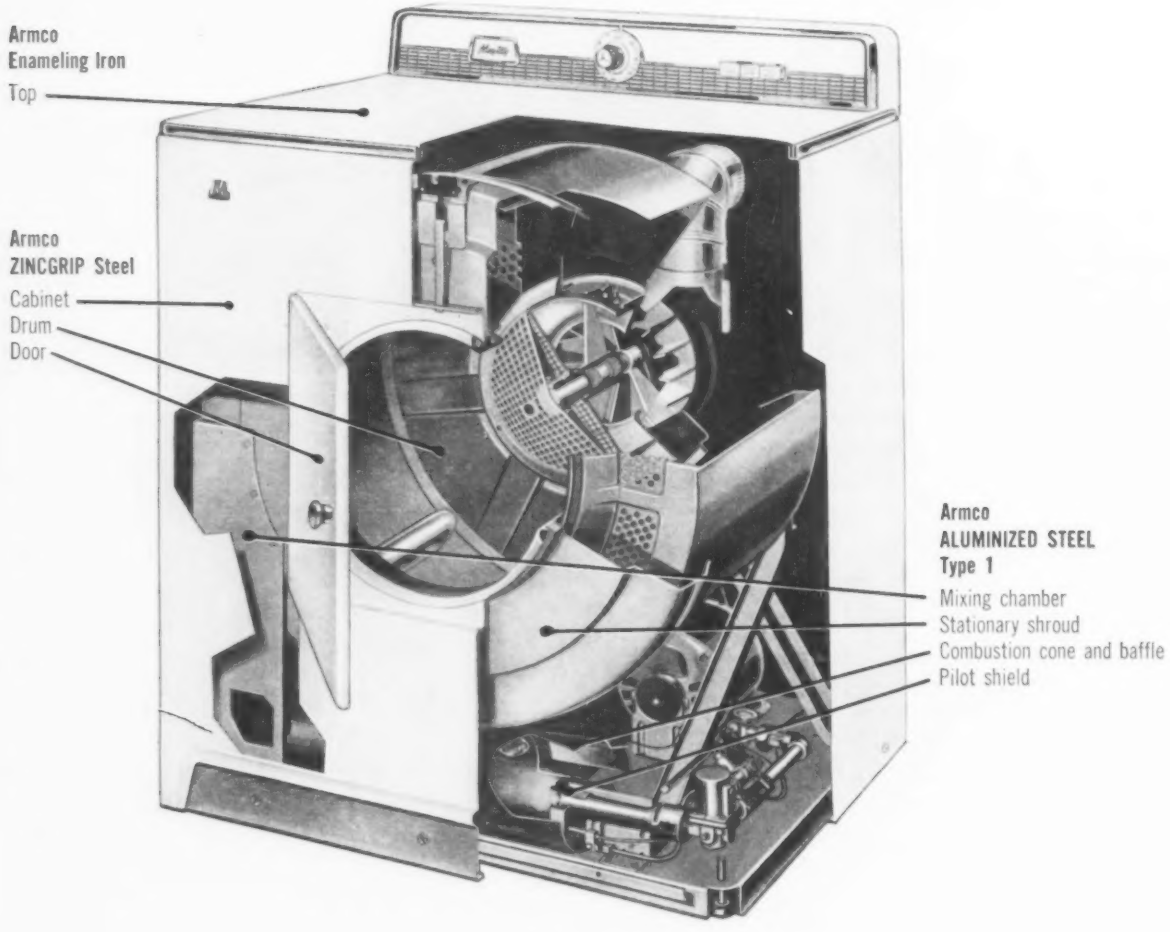


CONVEYING • PROCESSING • MINING EQUIPMENT . . . TRANSMISSION MACHINERY . . . CONTRACT MANUFACTURING

JEFFREY

How 3 Durable Armco Steels

Here's where Maytag uses special Armco Steels to help insure top performance of new "Halo of Heat" gas dryer. Corresponding parts of the electric model are also made of these special grades.



ARMCO STEEL

ARMCO STEEL CORPORATION • 1408 CURTIS STREET, MIDDLETOWN, OHIO

SHEFFIELD DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

in New Laundry Dryer

Fight Heat and Corrosion, Boost Efficiency

Three Special Armco Steels contribute greatly to durability and efficiency of new "Halo of Heat" dryers produced by The Maytag Company, Newton, Iowa.

Armco ALUMINIZED STEEL Type 1 is perfectly adapted for parts that must reflect or resist heat. The reason? It is steel hot-dip coated with aluminum by a special process. The aluminum coating reflects up to 80 per cent of the radiant heat that meets it. At the same time, this unique union of metals provides exceptional resistance to heat.

Armco ZINCGRIP® Steel assures complete protection for cabinet, drum, and door because its rust-resisting zinc coating does not flake or peel during fabrication. (Cabinet and door treated for painting by Maytag).

Armco Enameling Iron, with a durable, beautiful porcelain enamel finish, protects the top. This specially-processed enameling base resists sagging at all porcelain enamel firing temperatures. Enamel quality is better because it contains an extremely low percentage of gas-forming impurities.

Perhaps one of Armco's special steels can give *your* products powerful new sales advantages too. It's easy to find out. Just fill in and mail the coupon.

In addition to these three special steels, Armco produces stainless steels in a wide variety of forms, ALUMINIZED STEEL Type 2, ZINCGRIP PAINTGRIP®, Cold-Rolled PAINTGRIP, High-Strength Steels, Electrical Steels, Long Ternes, Steel Tubing, and top-quality Hot-Rolled and Cold-Rolled sheets.

ARMCO®

ARMCO STEEL CORPORATION
1408 Curtis Street, Middletown, Ohio

SEND more information about these Armco Special Steels:

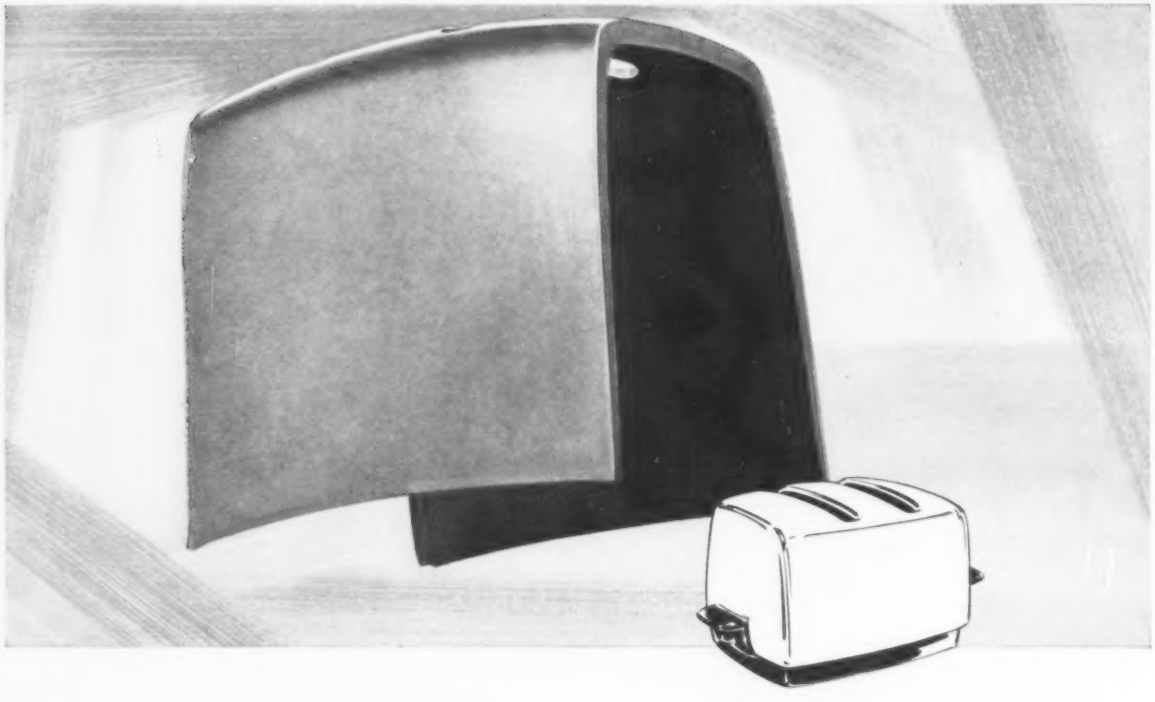
- ☐ ALUMINIZED STEEL Type 1
- ☐ ZINCGRIP Steel
- ☐ Enameling Iron
- ☐ Others_____
- ☐ We make_____

NAME_____ TITLE_____

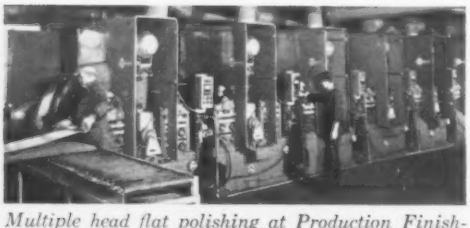
FIRM_____

STREET_____

CITY_____ ZONE____ STATE_____



Form flat-polished metal without marring!
Use Bonderite and Bonderlube



Multiple head flat polishing at Production Finishing Corporation, Detroit.

Polished sheets are treated with Bonderite and Bonderlube before forming.

Bonderite and Bonderlube protect that smooth, flat-polished finish through forming and fabricating. Parts go direct to the plating bath from forming operations with only a light buffing.

All types of products are being made this way—automobile bumpers, automotive trim, toaster and small appliance bodies, home laundry equipment components and many other formed parts.

Cost reductions are big with Bonderite and Bonderlube: Polishing costs on bumpers went from 9c a square foot for contour polishing to 0.8c a square foot for flat polishing before forming. Savings of 10c to 30c a square foot have been reported by other industries.

The Parker technical representative has full information on this cost-cutting combination. A letter or phone call will bring it to you.

Since 1914— leader in the field

PARKER RUST PROOF COMPANY
2197 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE	TROPICAL
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces	heavy duty maintenance paints since 1883

**Bonderite, Bonderlube, Parco, Parco Lubrite, Parker Pre-Namel—Reg. U.S. Pat. Off.*

it's **easy**

to recognize

superior quality

brass and aluminum

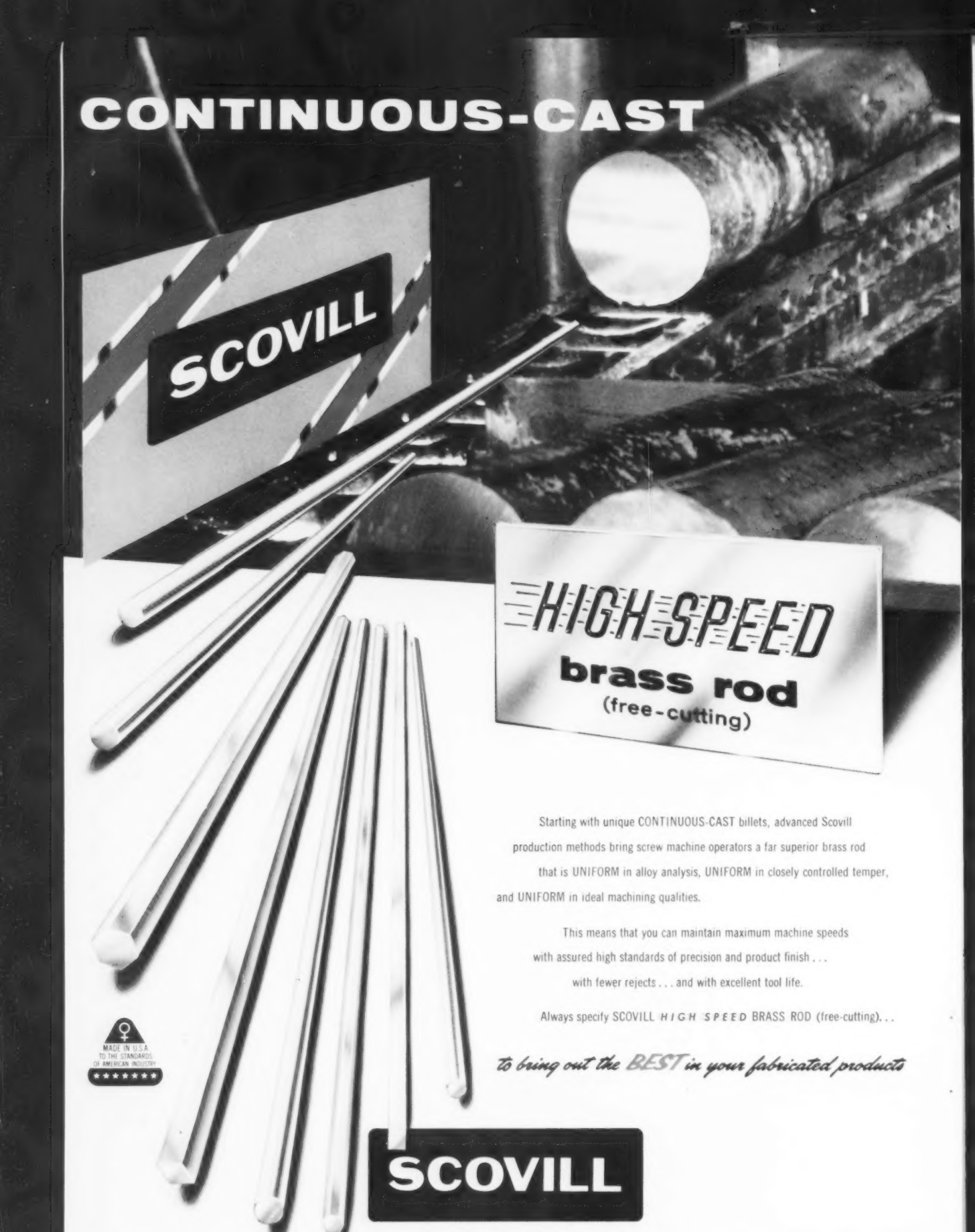
bearing this trademark identification

bring out the ***BEST*** *in your fabricated products*

SCOVILL

SCOVILL MANUFACTURING COMPANY
MILL PRODUCTS DIVISION, 99 MILL ST.
WATERBURY 20, CONN. PHONE PLAZA 4-1171

CONTINUOUS-CAST



HIGH-SPEED brass rod (free-cutting)

Starting with unique CONTINUOUS-CAST billets, advanced Scovill production methods bring screw machine operators a far superior brass rod that is UNIFORM in alloy analysis, UNIFORM in closely controlled temper, and UNIFORM in ideal machining qualities.

This means that you can maintain maximum machine speeds with assured high standards of precision and product finish . . . with fewer rejects . . . and with excellent tool life.

Always specify SCOVILL *HIGH SPEED* BRASS ROD (free-cutting). . .

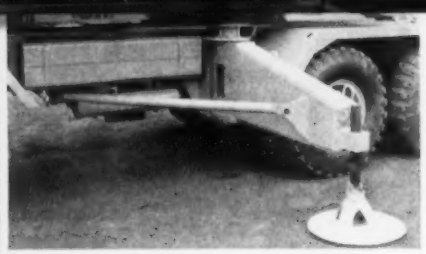
to bring out the BEST in your fabricated products

MADE IN U.S.A.
TO THE STANDARDS
OF AMERICAN INDUSTRY
★★★★★★★

SCOVILL

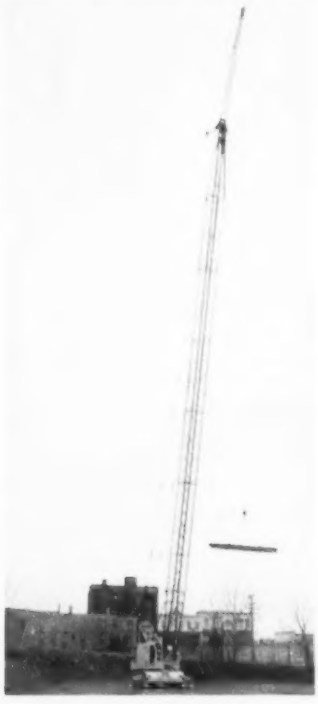
Scovill Manufacturing Company, Mill Products Division, 99 Mill Street, Waterbury 20, Connecticut. Phone Plaza 4-1171.

19SC57



AMERICAN'S EXCLUSIVE outrigger system sets up quickly, easily. Screw jacks, with large suspended aluminum floats give you fast, safe blocking. By reducing frame stresses, this revolutionary concept in outrigger design results in a lighter weight carrier—allows use of stronger machinery deck equipment for heavy duty work. It provides a stable base for handling the longest boom, the biggest loads in its class. Only the 500 Series can swing rated loads safely through a full 360° arc!

CAPABLE OF PICKING UP 150 feet of boom and 30 feet of jib—180 feet in all—this new American Truck Crane demonstrates its amazing stability, balance and power! The rugged boom sections, strongest in the field, are a full four feet square. Only the 500 Series can handle so much boom—offer such great lifting capacities in its class.



ALL NEW . . . from exclusive swinging outriggers to the longest, strongest boom in its class . . . it's the American 500 Series Truck Crane. Revolutionary new features put this heavy duty 40-ton capacity crane far ahead in on-the-job versatility, performance and operating efficiency.

NEW AMERICAN 40-TON TRUCK CRANE SWINGS RATED LOADS A FULL 360°!

You can pick up or spot loads *all around* the new American 500 Series Truck Crane. New scientific design permits a full 360° swing with full rated loads to give you materials handling flexibility never before possible with any truck crane. Examine the 500 Series—you'll find that it offers an unbeatable combination of strength and the greatest capacity—with the longest boom—in its class! The American's low over-all height and lighter travel weight are important in over-the-road moves.

Mechanically, you'll find that the 500 Series offers such important advantages as specially designed graduated air controls that give positive clutch control from smooth, easy engagement to full pressure with finger tip effort . . . liberal use of anti-friction bearings—in swing rollers as well as deck machinery . . . individually removable shaft assemblies . . . new design machinery base featuring straight-through girders and integrally welded roller supports that offer maximum strength, minimum weight and accurate roller alignment . . . engine controlled load lowering . . . engine controlled boom lowering . . . retractable high gantry . . . plus countless other job-tested features that cut operating costs, boost efficiency and keep your jobs on schedule month after month. Your American Distributor will bring you detailed information, all the facts on this important addition to the big American Excavator and Crane line that offers capacities starting at $\frac{1}{2}$-yard, 12$\frac{1}{2}$ tons and up!

AMERICAN HOIST PACIFIC COMPANY
Special materials handling equipment

CROSBY-LAUGHLIN DIVISION
Drop forged fittings for wire rope-chain

AMERICAN HOIST
and Derrick Company
St. Paul 7, Minnesota

EXCAVATORS-CRANES to 2 yds.-50 tons
LOCOMOTIVE CRANES to 130 tons
DERRICKS-HOISTS to 800 tons
REVOLVER CRANES to 400 tons

AIR REDUCTION *announces*

AIRCOMATIC PULL GUN—built-in drive rolls pull the wire all the way. Handles hard wire from .020 through 1/16th inch diameter; soft wire from .030 through 1/16th inch. Two models: 200 amperes, air-cooled; 350 amperes, water-cooled.

Push Gun handles hard wire from .035 through 3/32 inch diameter; soft wire from 3/64 through 1/8 inch. Two models: 350 amperes and 500 amperes, water-cooled.

AIRCOMATIC WIRE FEEDER—shown here with cover removed. Motor compartment at left, bracket support for wire at right, reel deck at rear. Note speed control knob and carrying handle on front of unit. Model for use with Push Gun designed with drive rolls substituted for wire bracket. Adaptable for bulk wire system.

UNIVERSAL CONTROL PANEL—for permanent installation near welding power source. Components are easy to reach. Most are plug-in. All sub-assemblies packaged to be replaceable as sub-assemblies. Motor speed control circuits printed on their mounting panel. High efficiency, low maintenance features such as these are typical of the 1958 AIRCOMATIC units.

the new **AIRCOMATIC®** *package...*
most flexible welding system in the industry

- **push or pull operation—to handle wide range of wire diameters**
- **welds from 1/16" aluminum sheet up**
- **compact, portable—operates up to 100 feet from control panel**
- **stepless self-regulating speed control**

MAIN COMPONENTS of the new Aircomatic package.

1—Portable Aircomatic Wire Feeder, adaptable for push or pull operation; can go anywhere a man can go, up to 100 feet from the control panel.

2—Aircomatic Pull Gun; or, for larger wire, the No. 21 Standard Aircomatic Push Gun (not shown).

3—Universal Control Panel, designed so that every element you ever have to handle is readily available for instant inspection.

The new AIRCOMATIC package, developed by Air Reduction engineers, now enables you to select a system that meets your exact welding needs.

Rugged heart of the system is the electronically controlled AIRCOMATIC WIRE FEEDER, which can be adapted to either pull or push operation.

Teamed with the Wire Feeder is the new AIRCOMATIC PULL GUN, designed particularly for small diameter wires . . . and the No. 21 AIRCOMATIC PUSH GUN, designed for heavier operations.

Completing the package is the all-new AIRCOMATIC UNIVERSAL CONTROL PANEL, featuring many advancements unique to such equipment.

In addition to the basic units, the 1958 Airco line includes remote speed controls, color coded wire guides, and kits for all guns and wire sizes.

Have you a tough application in mind? Send for literature. Then call your nearby Air Reduction sales office—and let a Technical Representative help you choose matched equipment to do the job.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND . . .

AIRCO®

Offices in most principal cities

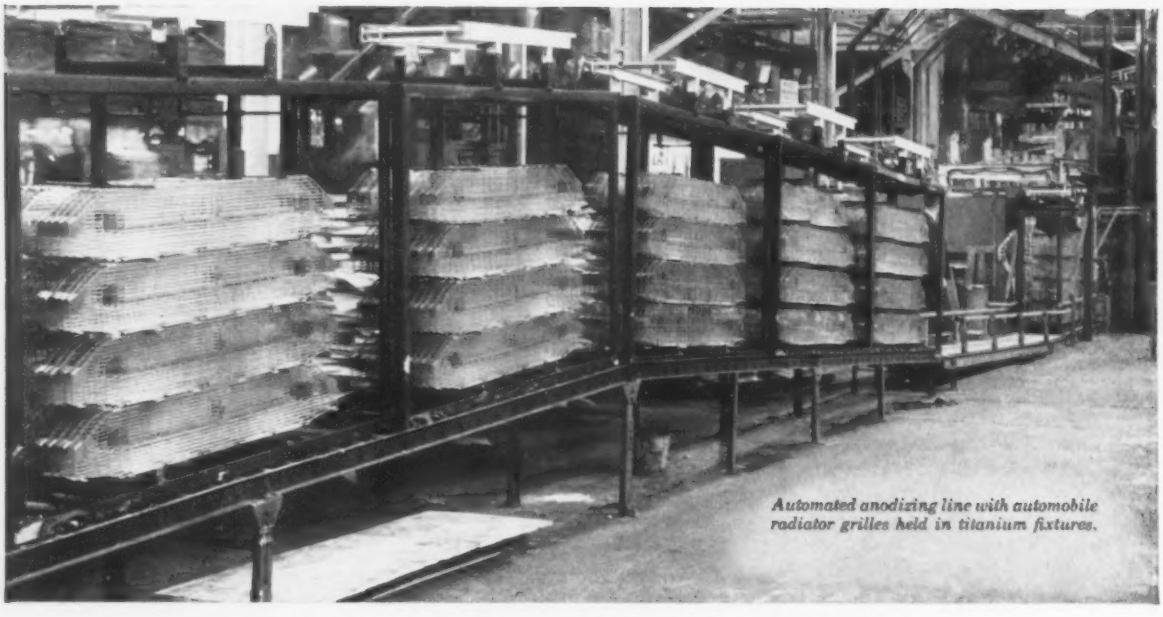
AIR REDUCTION SALES COMPANY

A division of Air Reduction Company, Incorporated
150 East 42nd Street, New York 17, N. Y.

On the west coast — Air Reduction Pacific Company
Internationally — Airco Company International
In Cuba — Cuban Air Products Corporation
In Canada — Air Reduction Canada Limited

Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide — gaseous, liquid, solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl acetate, alcohols, and other synthetic resins.

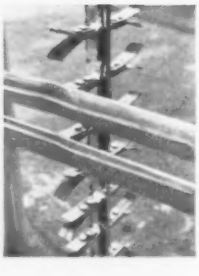
Progress with **TITANIUM**



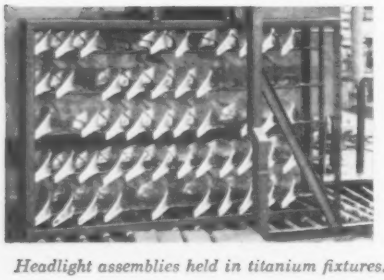
Automated anodizing line with automobile radiator grilles held in titanium fixtures.

TITANIUM LASTS 20 TIMES LONGER

in this anodizing process



Close-up of moldings held in titanium tips on anodizing rack.



Headlight assemblies held in titanium fixtures.

This automatic anodizing line at Reynolds Metals Company, Louisville, Kentucky, handles aluminum automotive parts on a huge scale. Parts such as window frames, grilles, hood moldings and headlight assemblies, are mounted on racks, which are first dipped in a brightener solution (highly concentrated sulfuric and phosphoric acid), then into an electrolytic bath.

What metal should be used to make the racks? Typical rack life at Reynolds was only 6 days on one anodizing line until titanium was tried. Average rack life is now *120 days.*

For economy in construction, the basic racks are made of aluminum, which is rubber coated. The rack tips or holding fixtures, which must be left bare, are made of Mallory-Sharon commercially pure titanium, riveted or welded in place.

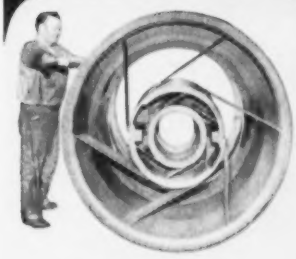
Titanium in this mass production operation yields substantial savings, prevents the disruption of constant replacements. Let us help *you* evaluate titanium wherever you have the problem of corrosion. Write for booklet listing titanium corrosion-resistance data.

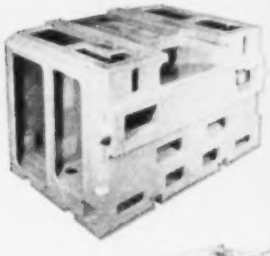
MALLORY-SHARON

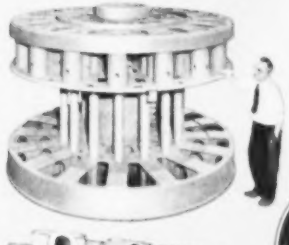
METALS CORPORATION • NILES, OHIO

Integrated producer of Titanium • Zirconium • Special Metals

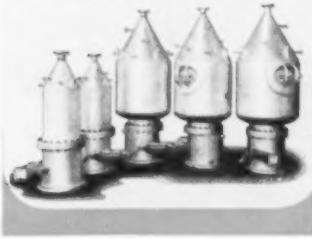
Steel-Weld FABRICATION







Use WELDED STEEL for Greater Strength with Less Weight!



The 46-Ton Weldment, illustrated above, is one of two Reaction Girders which, after machining, will become integral parts of a 390-Ton Vertical Lift Gate in a Lock Mechanism in the Long Sault Canal at Massena, New York. Mammoth Weldments such as this Lift Gate, and the diverse pieces at left, are typical of the thousands of Steel-Weld Fabricated parts and assemblies produced by Mahon each year for use in processing machinery, machine tools, and other types of heavy mechanical equipment. If you are not now taking full advantage of the economies offered by welded steel components in your product, you should give the matter serious thought. In the design of almost any type of heavy machinery there are parts and sub-assemblies that can be produced more economically, more satisfactorily, and in less time, in welded steel. In weldments you get greater strength with less weight—plus the additional advantages of greater rigidity and 100% predictability. When you consider weldments, you will want to discuss your requirements with Mahon engineers; because, in the Mahon organization you will find a unique source for weldments or welded steel in any form . . . a fully responsible source with complete facilities for design engineering, fabricating, machining and assembling. See Sweet's Product Design File for information, or have a Mahon sales engineer call at your convenience.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago

Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON

I was a harried production executive until I ***started*** *specifying Republic Fasteners. I'm still a harried production executive but, man, are my assemblies strong!*

(with a bow to CARRIER)

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World's Widest Range of Standard Steels

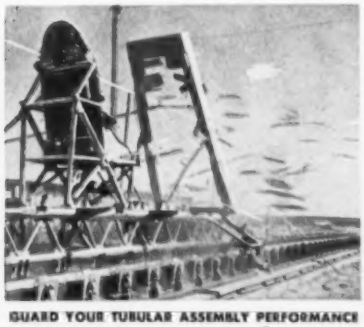
Guard Your Critical Assemblies with Republic Fastener Dependability

No assembly can out-perform its fasteners. And every production man will agree there are enough problems to solve without taking a chance on these vital parts.

There's an easy way to guard your critical assemblies. Specify Republic Bolts and Nuts for holding power you can depend on.

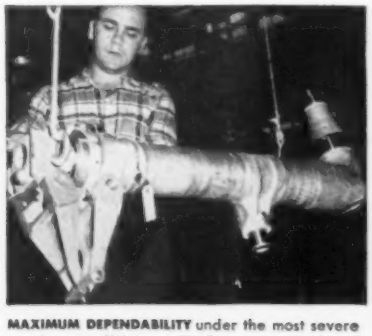
Republic Fasteners are made to the same standards that guide the entire industry. But in addition to meeting standards, Republic provides top quality through closely controlled, integrated production from iron ore to finished steel fasteners. Rigid mechanical and metallurgical tests are your assurance of extra value in Republic Fasteners.

So don't just order fasteners, *select* Republic and be sure of the best. They cost no more than ordinary brands. Check your local representative or distributor for information on the 20,000 standard and 8,000 special types and sizes available. Or mail coupon.



GUARD YOUR TUBULAR ASSEMBLY PERFORMANCE by specifying Republic ELECTRUNITE® Mechanical Tubing. Its uniform wall thickness, concentricity and physical properties give you predetermined product performance—plus cost cutting advantages in bending, forming and welding operations. Available in a wide range of sizes and shapes, in carbon and ENDURO® Stainless Steels. For more facts, send coupon.

DEPENDABLE ALL-STEEL CONSTRUCTION of Republic Materials Handling Equipment reduces maintenance to a minimum, helps keep materials movement at peak efficiency. These bar carriers, for example, cut handling costs and eliminate unsafe, disorderly conditions. For expert advice on improving your materials handling operations, contact Republic's local Pressed Steel Division representative. Mail coupon for details.



MAXIMUM DEPENDABILITY under the most severe service conditions calls for parts made of Republic Alloy Steels. Whatever your application there's a grade to suit your machinability, hardenability and strength requirements. Or Republic metallurgists can work with you to produce a type suited to the most critical specifications. Send coupon for further information.

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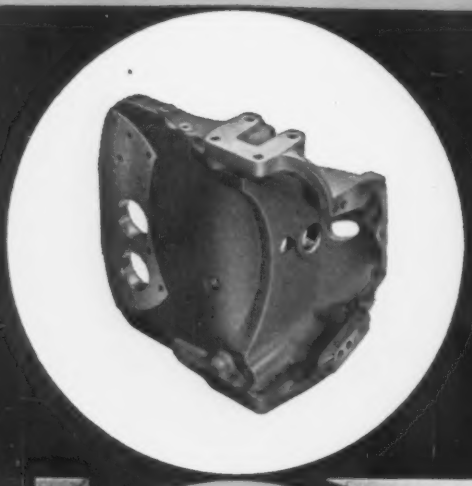


At Massey-Harris-Ferguson

Natcos Save 100 Parts...

Three multiple-spindle Natcos bore, drill, spotface and tap the front end support for a Massey-Harris-Ferguson tractor

NATCO

60 Man Hours Every

on Rugged Axle Support Castings

Massey-Harris-Ferguson checked it two ways. Nine general-purpose machines would do the job—or 3 Natcos. They chose the Natcos for these reasons:

- *Saving of $30,000 in machine cost*
- *Saving of 60 man hours every 100 parts*
- *Saving of 65% in floor space*

The Natcos handle all drilling, boring, spotfacing and tapping—a total of 67 operations on the 182-pound front axle casting. The casting is heavy, irregular—tough to fixture and clamp. The Natcos meet production requirement of 11 parts per hour.

Natco provided complete tooling which features automatic clamping, cycling and chip blow-out. All three machines are of unitized construction, giving Massey-Harris-Ferguson the flexibility to run different parts of redesigns of the same part.

Let Natco Field Engineers point out cost-saving and time-saving methods on your next drilling, boring, facing or tapping job. Natco offices are located in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland and Los Angeles; distributors in other cities.

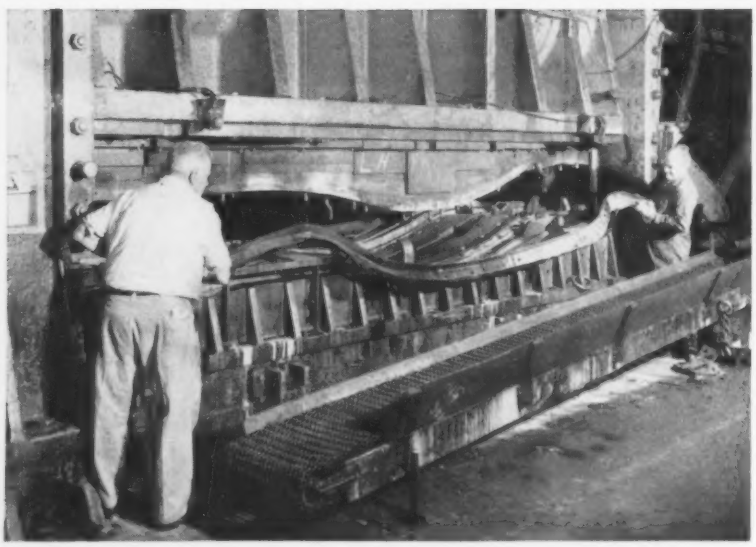
National Automatic Tool Company, Inc.

Richmond, Indiana

Multiple-spindle drilling, boring, facing and tapping machines. Special way-type, index and transfer machines.

Twelve different types of frames for one automaker alone are fabricated from Pittsburgh Steel Company sheet in the Detroit Division of Dana Corporation. Here completed frames are moving to the paint shop.

Pittsburgh Steel sheet helps auto designers improve cars



Steel strip begins to look like the side-rail of an automobile frame. This big forming press forms the blank into half a side-rail section.

Improvements In Frames Demand Better And Better Steel

Formability of sheet steel is speeding production for a large manufacturer of auto frames.

At Dana Corporation's Detroit Division, where as many as 4,000 frames can be made in a single day, a unique forming operation has been developed which requires a high degree of this quality called formability.

Known as edgewise bending, the operation would be impossible without hot rolled sheet steel of top quality—like that supplied Dana Corporation by Pittsburgh Steel Company. Because sheet from Pittsburgh Steel has great formability it undergoes severe deformation without rippling, tearing or peeling.

This kind of formability is important to sheet users every-

where who process steel into finished products.

At Dana, cut lengths of sheet are sheared into strips which measure approximately 205 inches long for one standard type of auto frame. These blanks move through a specially-designed edgewise bending machine which holds each strip perfectly flat while pushing part of the strip against one edge. At the same time that two sections of the strip are being pushed edgewise a total of 13 inches, the remainder of the strip is held motionless and straight.

• **Kick-ups in Frames.** The result is two curved sections, one near each end of the strip. These curves give the finished frame the "kick-ups" over the wheels which allow modern cars to hug the road.

Edgewise bending replaced a process which required taking a much larger piece of steel and cutting out the desired curved shape, cookie-cutter fashion, with a high scrap yield.

Only the best sheet steel will take edgewise bending with the steel flowing smoothly into new shapes. That happens when steelmakers achieve just the right degree of formability while keeping steel's inherent toughness.

Consider what has happened in the making of auto frames alone to see how the automotive industry's demands resulted in better sheet steel.

Only five years ago, one of the best known makes of cars had only three standard frames. Now it has twelve. In the intervening years, frames have become 50 percent stronger. They're now made with more severe bends. They're wider and made of steel 40 percent thicker on the average. "Kick-ups" have become higher and higher.

• **Rigid Specifications.** Specifications for physical characteristics and grain structure became more rigid as frames underwent an increasing amount of shearing, punching, die and press work and welding.

Ever since Pittsburgh Steel Company entered the sheet market, its hot and cold rolled sheet has kept pace with the demands for steel that could take more and more deformation.

Whatever your use for sheet, you can benefit from the skilled know-how that has constantly improved the quality of Pittsburgh Steel sheet.

You'll benefit from increased formability that gives you faster, smoother production with fewer rejects. You'll gain, too, from steel of increased toughness. Start benefiting today by calling the nearest Pittsburgh Steel Company district sales office.

Edgewise bending of sheet steel strips is a unique operation at Dana. This machine pushes each strip into a curved section by holding part of it firm while pushing against the edges of other sections.

After edgewise bending, the steel strips are curved at each end. These curves will provide the "kick-ups" which are necessary for extra room over each wheel.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

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Atlanta	Cleveland	Dayton	Los Angeles	Pittsburgh
Chicago	Dallas	Detroit	New York	Tulsa
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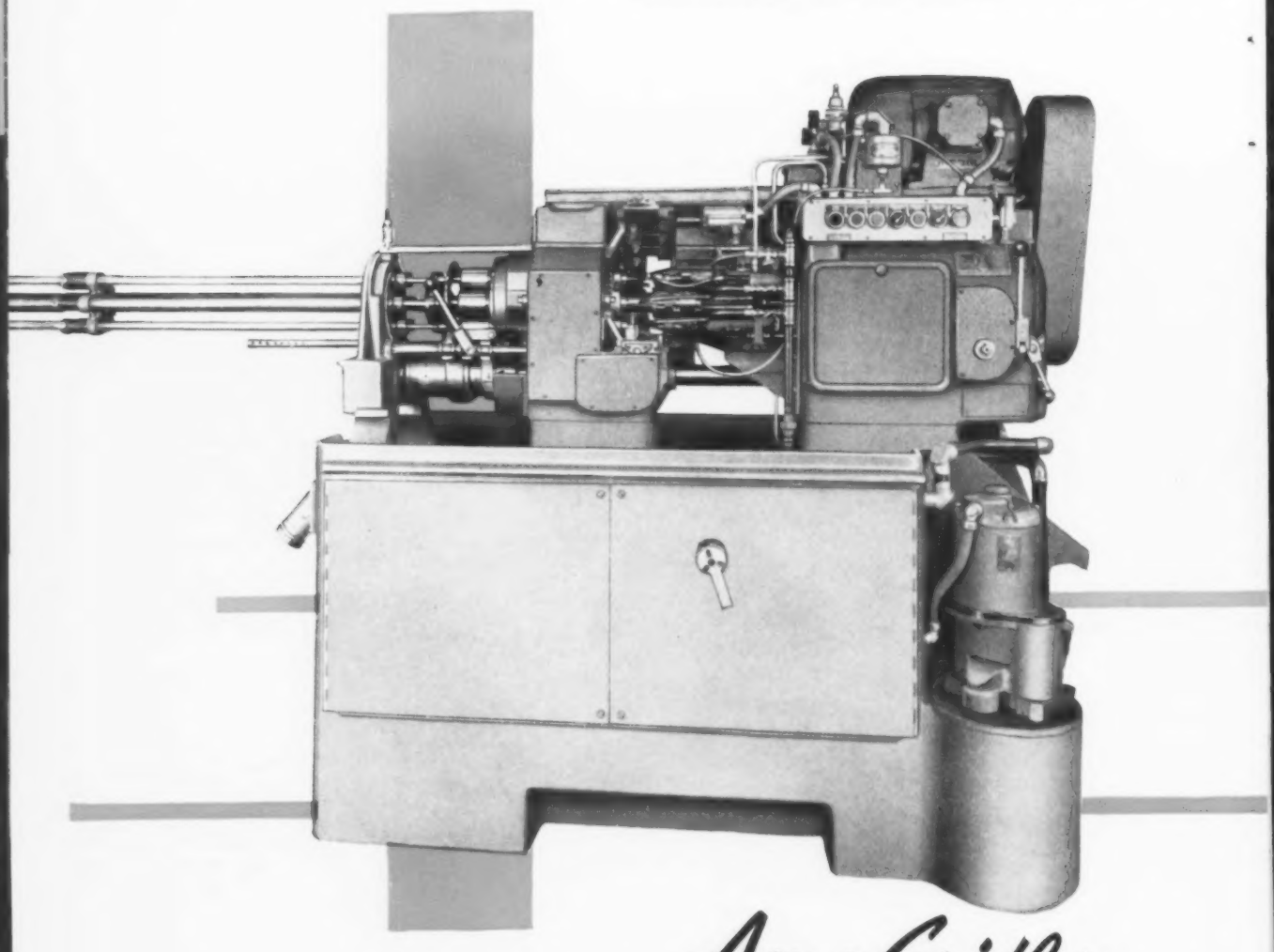
NAMCO Standard Quick-change tooling available on . . . .



this all-new Acme-Gridley 7/16"-Six Spindle Bar Automatic gives you the lowest cost per piece.

HIGH PRODUCTION ACCURACY — sustained at highest speeds and feeds through proper weight distribution and support of toolholders without overhang.

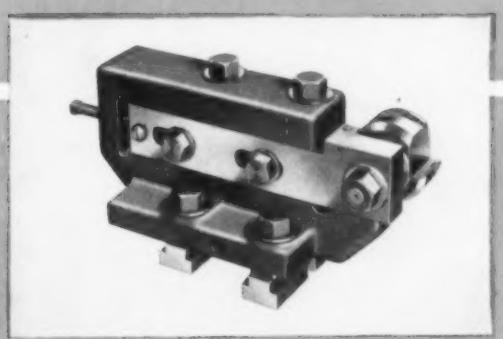
WIDE TOOLING VERSATILITY — through independently operated cross slides, spindle stopping (option) and a variety of standard and special attachments.

LONG OPERATING DEPENDABILITY — extra reserve power—strength for top performance with *all* tools.

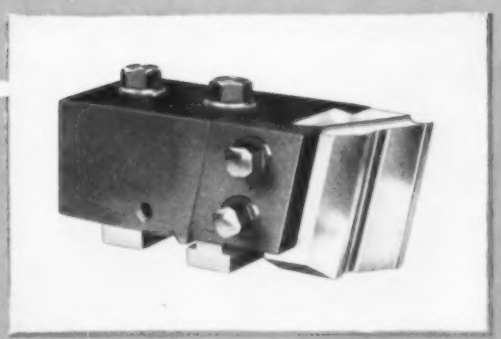
. . . the new 7/16" Six as on all Acme-Gridley machines—supplied as standard equipment—at standard tooling prices

Production efficiency is measured by the total cost of the job run. The "quick-change" tooling of Acme-Gridleys, in addition to their other outstanding high output characteristics, assure low costs on all production runs. Illustrated here are three of the many "quick-change" toolholders available for all size Acme-Gridleys, which require only the simplest of gauging on the machine when setting up or resharpening.

Hinged type toolholder allows quick-change side removal of drill bushings, counterbores and shank type toolholders by simply loosening two clamp bolts.



This "quick-change" toolholder permits the circular tool and block to be removed for tool sharpening.



Only two bolts need be loosened to release the tool for sharpening in this Dovetail Toolholder. A simple straight edge can be used to accurately align the tool when it is replaced.

Find out more about "quick-change" tooling as engineered into Acme-Gridleys for lower total production costs.

National Acme

THE NATIONAL ACME COMPANY, 175 E. 131ST STREET, CLEVELAND 8, OHIO • Sales Offices: Newark 2, N.J., Chicago 6, Ill., Detroit 27, Mich.

Carpenter Stainless Tubing Cuts Heat Transmission To Soldering Iron Handle

Soldering irons of this type are used in the manufacture of electrical and electronic equipment and instruments. The low heat conductivity of Carpenter Type 430 stainless welded tubing minimizes the amount of heat carried from tip to handle of the iron. The tube measures 21/64" O.D. by 0.017" wall thickness and sheathes the shank of the iron.

The polished surface shows good resistance to atmospheric attack and tarnishing. Carpenter Type 430 Stainless Tubing is ductile and readily forms into desired shapes by bending, pressing, drawing, etc. It is available in sizes of ¼" to 4½" O.D., with 12 to 25 BWG from your closest Carpenter Distributor or mill representative. He can also supply you with performance data and any technical aid you may need.

MEMBER

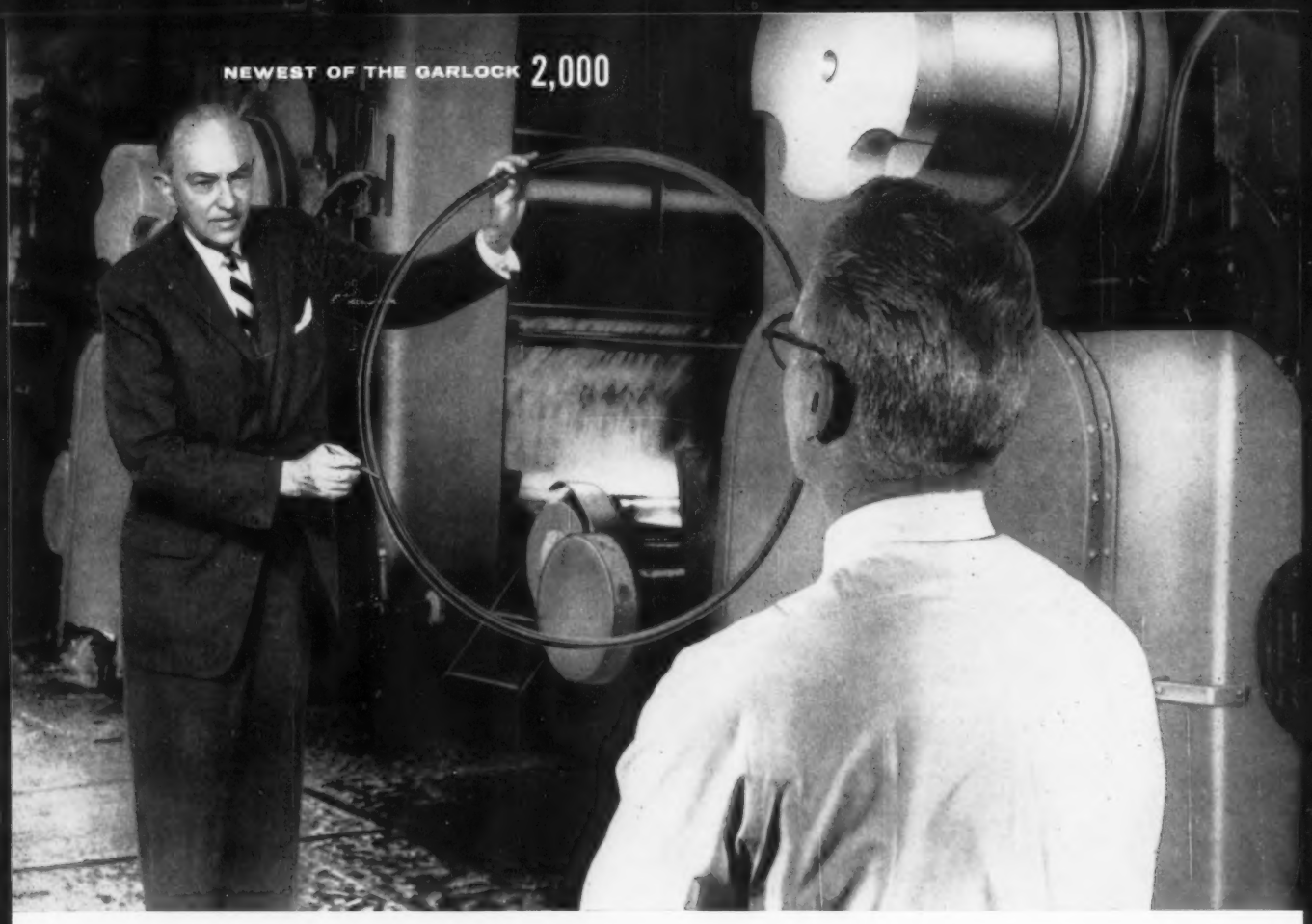
The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Carpenter

more than corrosion resistance

Stainless Tubing & Pipe



Garlock introduces new low cost KLOZURE* Oil Seals for large shafts

Here's a new KLOZURE Oil Seal that will save you money on initial installation and replacement. It's the new Model 2782 Garlock KLOZURE for large shafts up to 44" diameter operating at normal to high speeds, at temperatures to 275° F., on applications with low pressure differentials of approximately 5 psi. A garter spring holds the Buna-N sealing element in contact with the shaft. A precision formed case molded to the sealing element protects the seal from damage, and provides a press fit for proper installation.

Selection of a KLOZURE Oil Seal for your job is easier and more economical because Garlock has one of the largest stocks in the industry. And KLOZURES, of course, are just a part of the famous Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for every need. The *only* complete line. Ask your local Garlock representative for his unbiased recommendation, or write for additional information on the Model 2782 KLOZURE.

Cross section Model 2782 Klozure

THE GARLOCK PACKING COMPANY, Palmyra, New York

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

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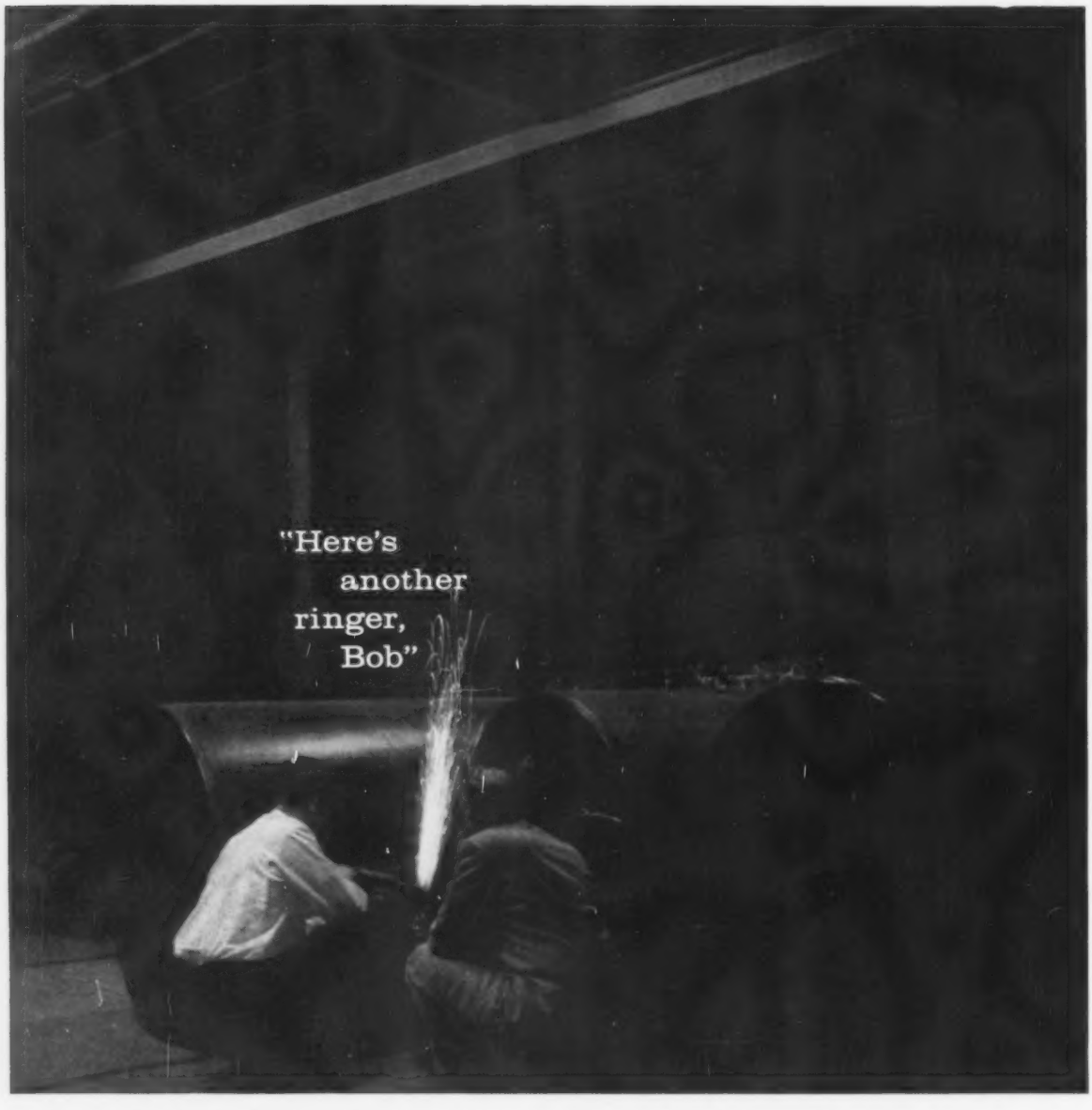
GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products



It was cold and dark in the shop that night. Everyone had gone but the foreman and Pete Clybourn, Inland mill representative, who was busy preventing a costly slowdown in production.

This company, a manufacturer of steel tanks, had run into some unforseen trouble. They had inadvertently used a few pieces of the wrong specification steel in the manufacture of a section for a quantity of tanks. But in which particular tanks, nobody knew.

About 3:15 that afternoon Pete had stopped by on another mission and the foreman had mentioned his problem. Pete immediately offered his services; then drove several miles across town to borrow a spark testing outfit. Back at the shop, it was well into the night before he finished testing the complete lot of tanks, in the process of which he uncovered three would-be troublemakers.

There are not many men today who can do the really competent job of spark testing that Pete did that night. We think it typifies a man who's conscientious, knowledgeable, thoughtful . . . the kind of man you're likely to meet when you do business with Inland.

INLAND STEEL COMPANY

30 West Monroe Street · Chicago 3, Illinois | *Sales Offices:* Chicago · Milwaukee · St. Paul · Davenport · St. Louis · Kansas City · Indianapolis · Detroit · New York

INLAND

Electrical Control Device

New magnetic-ball devices promise low-cost, trouble-free control of electrical circuits. They have no mechanical linkages which could fail in service, but do possess large load-carrying capacity in response to minute control energy or input signals. When used as a proximity switch, for example, the magnetic-ball unit will carry a full load indefinitely without auxiliary amplifiers.

Stronger Magnesium Alloys

Some ternary alloys based on the highly ductile magnesium-lithium phase show outstanding strength-to-weight ratios while retaining adequate ductility. An embrittling reaction has been identified and means developed to circumvent it. Continuing studies will cover melting methods and the important mechanical properties.

Aluminum-Steel Containers

Researchers say it's feasible to vacuum-deposit ductile aluminum films on mild steel for use in certain types of containers. A successful deposition technique was worked out to produce bright, uniformly coated samples. Test panels stood up well under bend, peeling and rusting studies.

Protest Surplus Tool Sales

Used machinery dealers, hurting for lack of business, want Uncle Sam to go slow in disposing of surplus machine tools. Officials of the Machinery Dealers National Assn. met with Defense Dept. brass last month to review disposal policies. Similar sessions may be requested with top people in the Office of Defense Mobilization, also the Business and Defense Services Administration.

Labor Unions Woo Public

You'll see a step-up in public relations activity by all the major unions, particularly those that figured prominently in the McClellan racket hearings. Witness the nationwide TV series set up by the United Steel Workers. Their "TV Meeting of the Month" aims to show the public how a big union works—in a favorable light, of course.

Reliable Sales Forecasts

Sales forecasting creeps closer to scientific accuracy. One firm's forecasting department, looking four months ahead, seldom errs more than 10 pct from actual sales results and has hit within 2 pct. Instead of a crystal ball, the team uses a computer and selected sets of national statistics. Each of the latter is weighted for its relative ratio to consumer buying over a long period. Consistently better accuracy is expected as forecasting skill improves.

Aluminum Picture Brightens

Aluminum producers look for a sales upturn early in the second quarter. Surveys show that customer inventories are low. Producers figure these stocks will have to be replenished soon. If so, the Big Three will be happy to expand current output rates. A general business upswing will come a little bit later, they believe.

Protection for Bearings

Another high-temperature barrier may soon be hurdled. Protective atmospheres are boosting the life span of ball and roller bearings in high-heat service. Bearings are being run in the 1000°F temperature range for 100 hours and more without signs of failure.

Homebuilders Take Heart

The nation's homebuilders anticipate a big come-back in activity this year. Some say that starts on new homes will hit the 1.2 million mark. Good news for metalworking is that sales of builders' hardware, household appliances and housewares will rise in proportion. This could put a lot of steam in the eagerly awaited business pickup.

Farval serves 1133 mill and crane bearings in Atlantic Steel's new bar and rod mill

FARVAL—
Studies in Centralized Lubrication
No. 205

KEYS TO ADEQUATE LUBRICATION—

Inset above shows Farval automatic pumping station No. 3, serving 240 points on 15 horizontal mills, edging mill, furnace switch and pullout, all designed and manufactured by Morgan Construction Company. Above you see *Farvalized* overhead crane and runout tables in the Atlantic Steel Co. mill room.

●Last word for modern machines and manufacturing practice, this Atlanta steel company also employs the most modern method of lubrication—Farval Centralized Lubrication. Twenty-four Farval systems keep mills and cranes running smoothly, serving a total of 1133 bearings.

You'll generally find Farval in evidence wherever steel is made or worked. Literally thousands of systems, automatic and manually operated, protect millions of bearings in the metals industries—some of them still efficiently on the job after 25 to 30 years of service.

Farval is the original Dualine system of centralized lubrication that delivers measured amounts of oil or grease under pressure to every bearing as often as desired. No bearing is ever missed.

Write for newly revised Bulletin 26-S, which tells the whole Farval story. The Farval Corporation, 3282 E. 80th St., Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.

SPECIAL REPORT

How To Survive In A Competitive Market

By John I Snyder, Jr.—Chairman and President, U. S. Industries, Inc., New York

It takes more than effort to stay alive in a competitive market. Management must keep on top of changing conditions.

To do this it needs up to the minute facts and the ability to act swiftly.

Here are some sound rules for winning the battle for business survival.

▪ The battle for business survival is always fought—and won or lost—on home ground. Success in a competitive market depends on how wisely a company judges the struggle and the steps it takes to win it. When the chips are down it's what your company does to stay afloat that counts.

Despite an overall business letdown, there is much you can do to strengthen your own position. In most cases it's not only a question of effort. Rather it's knowing what to look for and where to concentrate your competitive drive.

"Knowing what to look for" covers a lot of territory. Management, after all, is finally responsible for sales, research, manufacturing, new products—every area which contributes to a profit or loss. The larger the company the greater the responsibility.

Reach Danger Limit—But large, small or medium-sized, no one can be everywhere at once. And there is a limit to the amount of information any management can absorb. There is always the danger of being immobilized by a barrage of meaningless information.

Yet, when the competition gets rough, you must be free to make fast decisions based on sound facts. At U. S. Industries we are guided by a few fundamental rules for staying on top of a competitive situation. Our company is made up of fourteen divisions, formerly independent companies. The head of each division reports to a member of our top management staff.

Division heads are also free to

Pointers For Effective Management

—"Cut out nonsensical auditing functions. Figure out what good are the reports you get. Concentrate on meaningful information."

—"Maintain as much face to face contact with operating management as you can. It's well worth at least 50 pct of your time."

—"Look at least five years ahead in terms of individual products. Don't skimp on research and development expenditures."

—"Make sure you establish accountability for profit and loss. There are few better ways to tighten up your organization."

—"Constantly encourage and criticize the management team. Establish the freedom to beef. Get top people away at least twice a year."

—"Review periodically capital equipment requirements. Watch budgets carefully but don't refuse manufacturing the tools to win the battle."

—"Don't withhold your plans for new ventures from the board until you have a directors' meeting. They should be thoroughly discussed and decided in advance. If not, you may be in for a rude awakening."

John I Snyder, Jr.

and are encouraged to consult with management staff specialists in production, marketing, etc. No division manager is faced with a barrier to any member of the top management team including myself. This type of organization we feel combines the advantages of autonomous operation with the ability to maintain an objective overall viewpoint.

Rules For Action—But whether your company has a number of divisions, makes a variety of products or even a single product line everyone can apply these basic guides to effective management control.

Briefly stated the rules for heads-up management action call for:

1. The fast, accurate reporting of essential (and only essential) information to top management.

2. A continuing system of forecasting sales, profits and operating costs.

3. Placing the accountability for profit and loss in the hands of as few people as possible.

4. Closely scrutinizing, from top to bottom, those areas which the first three rules indicate are heading for trouble.

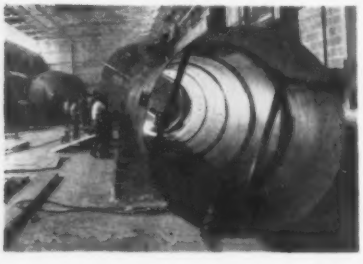
Let's take a look at how these principles are applied to various business situations, particularly in a tight or declining market. One of the simplest examples is that of controlling inventory costs.

In a down market it's axiomatic that inventories be kept as low as possible without endangering production or distribution. Money not tied up in inventory can be used to reinforce other areas of the business. Well-trimmed inventories also permit you to take advantage of declining materials prices.

Tie In Forecast—But when do inventories reach a dangerously low limit? The only safe way to judge is by relating up-to-the-minute inventory figures to a periodic short-term sales forecast.

In our divisions we make a weekly check on raw materials, goods in process and finished goods. Division managers also prepare a monthly, semiannual, annual and five-year sales forecast for top management. With the short-term forecast and last minute inventory figures they are in a position to take advantage of lower materials prices on the down-grade and to hedge against higher ones before the market starts back up.

This method of inventory control is only as good as the sales forecast makes it and the speed with which management receives and acts upon the information. However, there is not too much room for error if the reports are timely and the forecasts are periodically



Success Through Diversification

John I Snyder, Jr. has piloted U. S. Industries, Inc. through three reverses in the business cycle since he became chairman of the board and president in 1948.

From the investment banking firm of Kuhn, Loeb and Co. he was appointed to liquidate the debt-ridden freightcar builder, Pressed Steel Car Co.

Change Course — After close study he decided a better course lay in diversification and started an active program in 1949. It was so successful that by 1954 the firm's name was changed to U. S. Industries, Inc. to better reflect its operations.

In the past ten years the company has built itself a solid foundation in the metalworking industry with about three-quarters of its sales volume in this field. Among its divisions are such well-known metalworking names as Clearing Machine, Southern Pipe, Axelson Lathes, Chicago Steel Tank, and Garrett Oil Tools.

Balance Operations — The remaining sales volume is more or less evenly divided between military business, miscellaneous manufacturing operations and foreign distributorships for agricultural and industrial machinery. Recently U. S. Industries has moved into the fast growing electronic and atomic research fields with the acquisition of Western Design and Mfg. Co. and the Kett Corp.

The company is purposely balanced in the industrial equipment, consumer (Solar Permament) and government fields as a hedge against the trends in the business cycle. It's working out well. Since 1948 net sales have increased from $58 million to about $110 million in 1957 and net income from a loss of $2.3 million to a profit of $3.5 million.

revised. Corrections can be made before too much damage is done.

Cut Time Lag—This same type of thinking can be carried on at the higher levels of a company's operations to determine its competitive position at all times. For instance, every one of our divisions makes a monthly report of sales, profits and operating costs. At no time does this information for top management lag more than ten days beyond the period covered by the report.

By following these figures we can see quickly if one of our divisions is running into trouble and pitch in and help in whatever way we can. Of course, every division turns in more reports than these. But for a fast check on how every division is doing these are the ones to watch. In like manner similar "control" figures can be drawn up for a product line or even a single product.

So far we have covered two (quick reporting, periodic forecasting) of the four rules for survival in a period of falling business. The third (limiting the accountability for profit or loss) figures most importantly when it looks like trouble is brewing.

Need Fast Answers—If the operating figures over a number of months indicate that one or more of our divisions are heading into difficulty, top management can focus its attention on those areas. However, if we are to be of any help in reversing a trend we need answers quickly.

The fastest way to get them is to make one man accountable for the profit or loss picture. This relieves top management from a lot of time-consuming probing for the facts. It also eliminates intentional or unintentional buck-passing.

With this relationship we can get an overall view of a company's competitive fitness at any moment the same way other firms can get a quick reading on the profitability of individual products.

There is another point here I think quite important. There is no substitute for direct contact between top and operating management. In any multi-plant manufacturing setup a frequent interchange of information is a must.

TEAMWORK: Division heads have free access to top management group.

Get Close-up View—In fact, any management is remiss if it doesn't spend at least 50 pct of its time in the field. This is really the most effective route to sound communications and replaces a lot of long reports and directives. You just can't get close to people in memorandums.

Once these first three rules point out the need for top management action we are in a position to throw our full weight into solving the problem. We take no half-hearted look-see into a situation and no snap judgments are made. When needed, we make a thorough scrutiny of all division functions.

Unless he has really studied an organization no one can really tell the dead wood from the live wires —the "yes men" from those who are courageous enough to offer constructive suggestions. We foster a policy of encouraging people to speak out against what they think is wrong. In some cases, it's the only way you can put your finger on the real trouble.

Check The Product—One of the next areas we check is the product line itself. It may be that others have later models and we need a redesign or more sales appeal put into our line. Or there may be need to change the method for distribution.

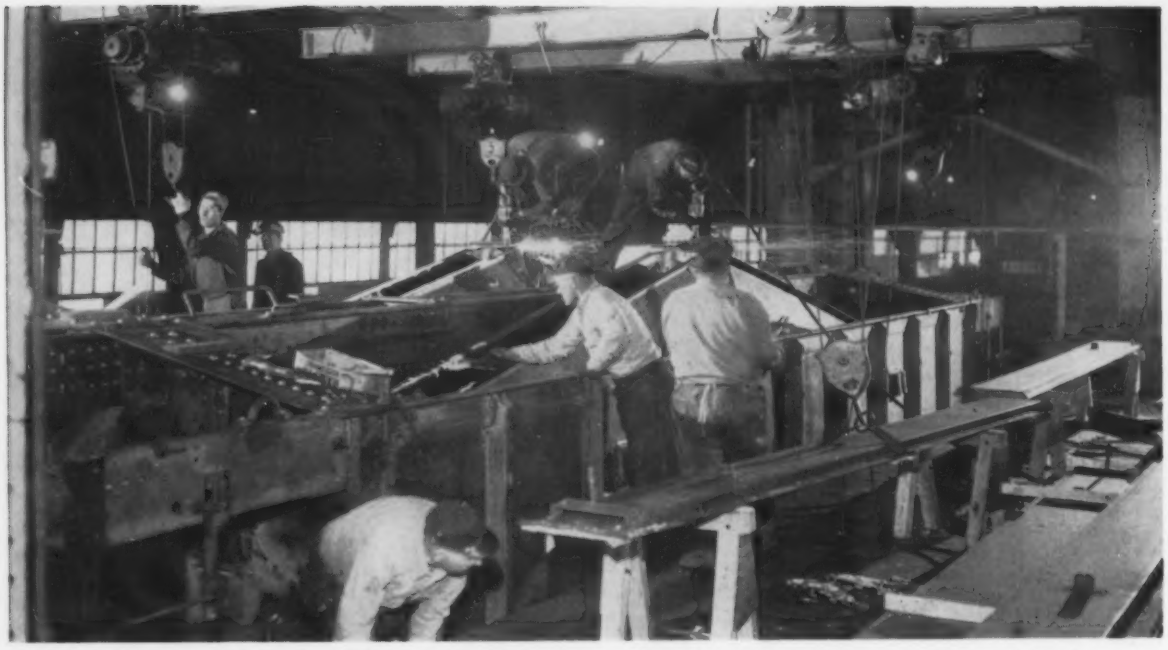
It may be wiser to sell through dealers or manufacturers representatives than sell direct from the home or branch offices. But in any case distribution methods are one of the first areas to look at in checking a company's profit on sales. Distribution costs can mean the difference between a profit and a loss.

Still a third solution may call for a regrouping of product lines for more efficient selling. We did this not too long ago with our Axelson Div. which manufactures machine tools, aircraft parts and oil well supplies.

By bringing the same concentration to bear on all other areas of the organization such as manufacturing, research, promotion, etc., we can more clearly define the division's weak points and take steps to bolster them.

During a temporary economic storm or even a long-term decline it's possible to lay the groundwork for a future advance. It all depends on how effectively and swiftly you can keep abreast of the current business tide.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., The IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.



HOW LONG? Car builders hope their work will continue at the above pace. But new orders are dwindling.

Freight Car Sales Head Downhill

Car builders are usually big steel consumers. But few are buying now.

They're working mostly from backlogs and trimming inventories to the bone.

▪ The freight car building industry, a bulwark of the steel market last year, is facing a famine in new orders. A year ago, car builders' backlogs totaled 117,257 cars. Right now, it's less than 56,000.

The backlogs were a carryover from 1955 when a record 163,033 new cars were ordered by the railroads. By comparison, only 39,994 cars were ordered in 1956 while in 1957 the total was 42,051.

Inventory Cleanup — To steel mills who usually count on freight car builders to consume about 3 pct of total domestic steel shipments, a dropoff in this market is hurting. Car builders, when they are working, buy large tonnages of plates, bars, sheets, and forgings. Last year this tonnage totaled 2.7 million, including that used for freight and passenger cars and locomotives.

With few new orders coming in, car builders are using up their steel inventories and are preparing to ride out the lean days ahead.

Old Cars Must Do—One large eastern freight car builder which turned out 1096 cars in the first quarter of 1957 will build only 410 in the first quarter, 1958. Its backlog for the second quarter amounts to a mere 166 cars.

Railroads readily admit that many cars now in service are old and should be replaced. The average freight car age is 19.19 years. But the roads are reluctant to make heavy commitments until the outlook for railroad earnings improves.

Three Examples—The nation's two largest railroads announced they will order no new cars in the foreseeable future. The New York Central, which for many years has stuck by its five-year improvement plans, has for the first time canceled its projected improvements. It says it will buy no freight cars in 1958.

A spokesman for the Pennsylvania Railroad said the company has many freight cars stored and is not placing any orders at this time. "And we won't until the business picture changes," he said.

The story is the same with many other railroads. The Baltimore & Ohio, which bought 425 hopper cars last year, says it is not ready to go ahead with any new orders.

U. S. Help Uncertain—Aid to the railroads may be forthcoming eventually from the Federal Government. The industry is putting new pressure on Congress for legisla-

tive relief from high costs and dwindling business.

Railroad leaders list more than a score of economic worries, but say they'll settle for immediate action on only four: A tax bill to help in retiring and replacing equipment and facilities; scrapping of excise levies on passenger and freight transportation; tighter restriction on farm product exemption enjoyed by some truckers; and a clearer definition of private carriage by motor vehicle.

But Federal aid is at least two or three years away. In the meantime the car builders are facing a famine.

Cable Skyway

Over 145 tons of four-in., locked-coil cable will be used to build two skyways for moving materials needed in construction of the Glen Canyon Dam, Arizona.

The cable will be fabricated at the Trenton, N. J., plant of American Steel and Wire Div., U. S. Steel Corp.

One cableway will stretch 2,050 ft between two towers on opposite sides of the Colorado River. The other will be 1800 ft between smaller towers.

Steel Payroll Record

The steel industry's payroll in 1957 was a record $4.001 billion according to the American Iron and Steel Institute. This tops the previous high, in 1956, by about $205 million.

The hourly payroll cost was also a new high, $2.917 compared to $2.70 in the previous year.

Total employment was also up, 656,700 over 653,400 in 1956. But the average wage earner's week dropped from 38.6 hours in 1956 to 37.2 hours.

Both employment and the average week for December were off from November. In the last month of 1957, 606,200 men worked an average of 32.9 hours per week. In November 625,700 workers toiled 36.1 hours a week.

New Wrought Iron

▪ Climaxing 17 years of research, A. M. Byers Co., Pittsburgh, is now producing and selling a new wrought iron product with about 20 pct greater corrosion resistance than "regular" wrought iron under "severe industrial atmosphere" conditions.

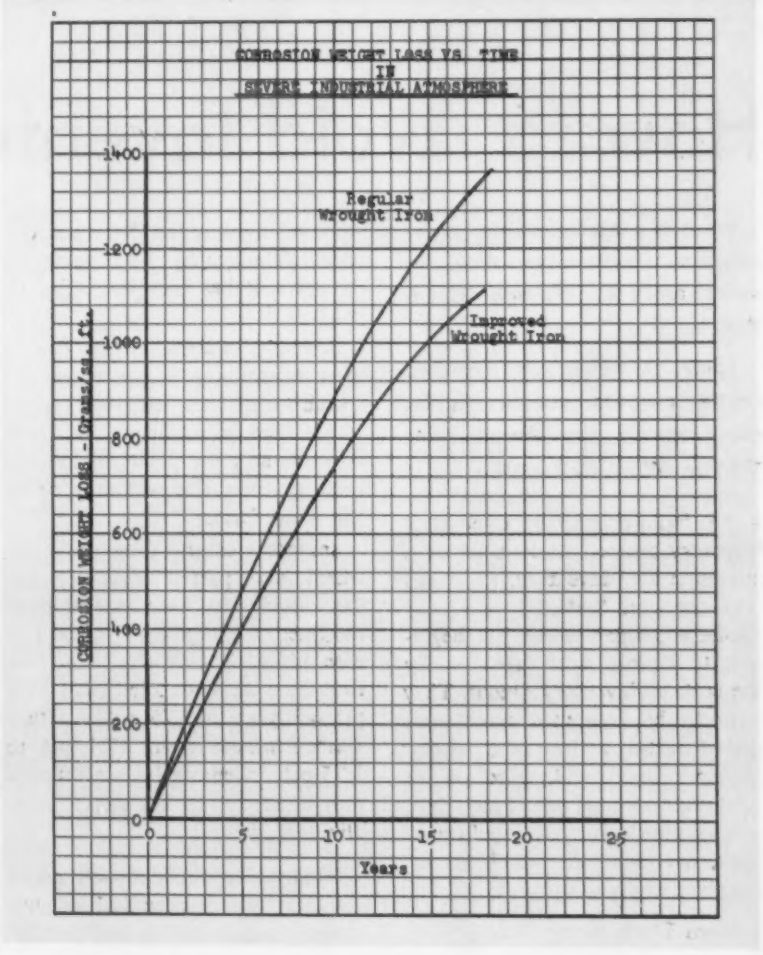
B. M. Byers, company president, said the company's new product—designated 4-D wrought iron—has demonstrated superior resistance to corrosion caused by industrial atmospheres, acid solutions, salt water, and steam condensates.

E. P. Best, chief metallurgist, said the improved product was achieved "by substantially increasing the deoxidation of the base metal; increasing the phosphorous content in relation to the other material components; and using a more siliceous silicate fibrous material."

Although production costs are higher, the new product will sell for the same price as standard wrought iron, according to A. S. Chalfant, vice president—sales.

Mr. Byers indicated that although tests on the new wrought iron are "conclusive," research studies will continue on this and other types of corrosion resistant metals.

Wrought Iron: New Versus Old



Why Runout Is Getting Top Management Attention

How far down can inventories be safely pushed?

In these times of strict inventory control, many purchasing agents believe they have already been pushed below the safety limit. Nevertheless, orders from the front office indicate they will be forced to reduce even further through the remainder of the second quarter.

In a majority of cases, the P. A. under pressure is hard put to produce facts proving that his inventory is getting thin—that he must have more raw material and components on factory shelves that have been getting barer for the past twelve months.

Little is said at any level of the company about runout costs. But major metalworkers are giving the problem more consideration, even putting key people on the problem.

Some top companies investigated, (appliance makers to steel warehouses) are applying anti-runout formulas to their inventory levels. Others have turned operations research teams loose on the "buffer" inventory problem.

The cost of a runout of a single item may run as high as 75 to 100 pct of the profit margin per unit of the finished product. In any case, runout costs are high.

How to Avoid Inventory Runout

What is a minimum safe inventory? It's a problem that deserves more management attention.

Some formulas for avoiding costly runouts are available. Most are in the development stage.—By K. W. Bennett.

▪ The basic problem in a period of inventory control is how to carry a minimum safe inventory. Emphasis is on the word "safe."

Many companies are just beginning to explore more than casually the costs of inventory runout. They have to be computed from such diverse factors as lost sales, loss of customer good will, purchase of rush-rush premium priced materials, cost of reordering in limited quantities, overtime labor, and the intangibles of expediting.

More Work Being Done—Some work on establishing economic ordering formulas has been going on for years. It has been intensified in the past decade.

A major business machine firm is working, through its operations research team, on a pattern formula. It can then be set up on the firm's computers in the plants of its customers. Even this will only be in the intial form.

Inventory control programs, even where only a partial "inventory runout formula" has been applied, have indicated startling success. In two case histories, one warehouse cut runout on items handled from 11.3 pct per year to 2.75 pct. Another slashed runout from 17.1 pct to 2.75 pct. Inventory investment rose only 6 pct. In one test case it actually dropped.

Ninety-nine Pct Safe—A major electrical firm has evolved an anti-runout formula for its low cost inventory items. This gives 99 pct positive protection against the danger of runout, but is applied only to items that are of low cost and are not ordered frequently.

The purchasing agent here multiplies average use by three times the square root of average use, and applies that as a minimum buffer stock.

Using electronic computers, several firms are going over their inventories, item by item, to figure the probability of runout for each item, based on past history.

By Computer—The first step is to figure inventory carrying cost per item, and subtract from this estimated runout costs multiplied by the figure for probability of runout. This is time consuming, but computers speed up the job.

The ultimate goal is the day when the sales forecasts will be fed into the computer, and it will come

up with the inventory levels, item by item, that will balance the most economic ordering quantity against runout costs.

Simpler Method—One firm did a comparative study to determine whether to reduce inventory or cut runout costs. In this particular case, a highly diversified operation, it was found that runout costs could be held at the same level while the dollar value of inventory was reduced.

A management consulting firm has put runout control on the same kind of slide rule basis that is already achieved in ordering economic lot sizes of materials for inventory.

Using a set of established facts, it is possible to use this to figure simultaneously: (1) The correct time for ordering an item from the supplier, (2) the best order quantity, and (3) the percentage of runout that could be expected.

Still Pioneering—This, like most inventory runout data, is in its pioneering stage. But it demonstrates that a computer isn't necessary to balance runout costs against optimum inventory levels.

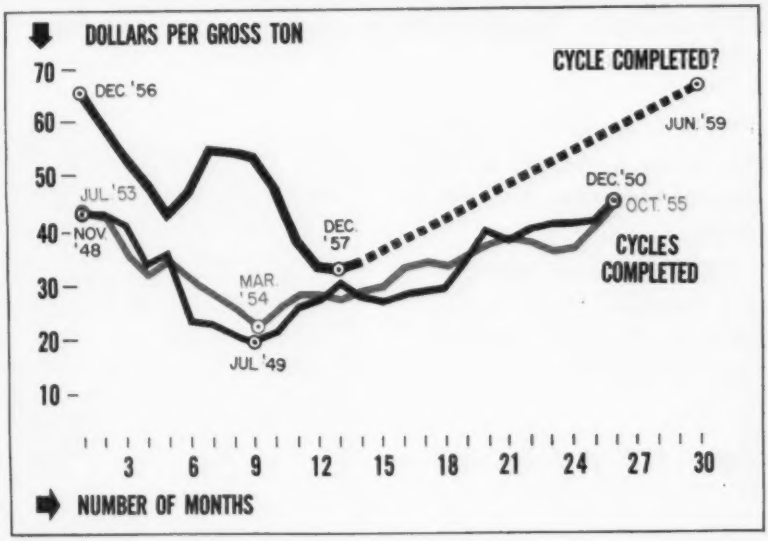
This method requires working out the following: The cost of carrying an order; inventory carrying costs; costs of a short item; lead time; average demand during lead time; number of working days; and, toughest of all, standard deviation of demand during lead time.

Inventory control is a three-part problem: First, the re-supply cost (the price you pay for an order of a raw material or components for your end product); second, inventory carrying cost; third, runout or depletion cost. Phases 1 and 2 are being attacked with considerable success. Phase 3 is just getting under way.

New Tube Equipment

Republic Steel Corp. will spend more than $300,000 for new equipment for the No. 3 electric weld tube mill at its Youngstown plant.

Do Past Cycles Forecast Scrap Price Behavior?



Scrap Price Cycles

■ When will the current scrap price cycle run its course?

I. M. Bettman, vice president of The David J. Joseph Co., Cincinnati scrap broker, would be the last to go out on a limb with a flat prediction.

But he has come up with some interesting figures, based on earlier cycles, that provide a rough foundation for estimating the end of the current price swing.

Current Cycle—Using The IRON AGE No. 1 Heavy Melting scrap composite price, Mr. Bettman points out that a peak of $65.17 per ton was reached in December, 1956. It took 50 weeks to hit a low of $32 in December, 1957, when the price again started to move upward.

In the 1948-49-50 cycle, says Mr. Bettman, it took only 34 weeks to touch bottom and 110 weeks to return to the starting price of $43.16. In the 1953-54-55 cycle, the bottom point was reached in 33 weeks, and complete recovery to the starting price of $44.92 required 120 weeks.

Points of Interest—Mr. Bettman makes these points in comparing the present cycle with the fluctuations of 1948-50 and 1953-55:

Extent of the present decline is comparable with the earlier ones.

The present decline started from a higher level, and has already lasted longer than the earlier periods of weakness.

Based on past patterns, a rapid price recovery seems unlikely.

Will Pattern Repeat?—If the current fluctuation follows generally the pattern of the earlier cycles, says Mr. Bettman, the market could not be expected to recover 50 pct of its decline (to a composite price of $48.50) until about October 1958. On the same basis, a 100 pct recovery would not be due until about June, 1959.

But Mr. Bettman cautions that there is no guarantee that the present market will follow the patterns of the past.

There is no certainty that the current uptrend will continue. Some industry sources believe prices could take another dip.

A World Market for Know-How

It's a New Commodity in Foreign Trade

Firms in all parts of the Free World are marketing their industrial knowledge and patent rights.

It's a two-way street, with U. S. firms both buying and leasing rights to production methods.—By G. H. Baker.

▪ A German metalworking firm has bought a U. S. process for making structural honeycomb from aluminum, stainless steel, and glass fiber.

A California electronics manufacturer has leased Swedish rights to make and sell industrial noise meters.

In Spain, a powder metallurgy industry is now in the making, thanks to lease of new Schwartzkopf processes by a New York firm.

New Foreign Trade—These are all current examples of a new and thriving kind of world trade—the marketing of industrial and patent rights. The biggest firm in this novel buy-and-sell activity is Porter International Co., of Washington, D. C., a bustling organization with agents already in 22 countries.

Porter International is headed by Paul R. Porter, formerly top U. S. administrator for the Marshall Plan in Europe. Mr. Porter's years in Europe for the U. S. government convinced him that industrial firms throughout the free world are clamoring for the opportunity to buy or lease rights to U. S. production methods.

U. S. Benefits Too—The same situation works in reverse: Many foreign firms have developed new techniques and products that will benefit U. S. manufacturers and fabricators. It's a two-way street, and the Porter organization, first of its kind in the world trading of industrial ideas, receives new inquiries every day from eager manufacturers in every nation outside the Iron Curtain.

Thompson Products, of Cleveland, has installed a new metal-polishing machine obtained from a German metalworking firm. Thompson's preliminary experience shows that the polishing machine (basically, a revolving drum) is capable of polishing small metal parts better and cheaper than had previously been possible.

Combinations Formed—Through pooling of production know-how, combinations of U. S. and foreign firms may be formed to exploit the full market potentials of products in world demand. Here's an example:

"A U. S. company—the leader in its particular industry—asked us to license its patented processes in England, France, and Germany. In doing so, we found both in England and in France licensees who had made important technical advances previously unknown to our client.

"Through a reciprocal exchange of information, the research work of the U. S. and foreign companies will henceforth be pooled, giving each an increased technical lead over its competitors."

On The Market—Here are some new production techniques and products now available.

From Sweden: Guided missile valves, bookbinding process, hose clamp.

From France: Process for metallurgical coke, variable speed gear, automotive suspension system, air combat training cabin, railway journal box.

From Germany: High-speed printing press, pharmaceuticals, industrial polishing machine.

From Belgium: Machine tools.

From Israel: Irrigation sprinkler.

From the U. S.; Nuclear reactor components, machine tools, nylon bearings, high-temperature ceramics, and many others.

How Much Does a License Cost

▪ If you agree to lease or license the process of a foreign firm, you'll need a custom-made agreement to fit your product and the market conditions in your industry. However, the following points are common to all license agreements between metalworking firms here and abroad:

1. Licensees must be prepared to pay a flat disclosure fee to the licensors. Such a fee ranges from $2500 to $35,000.

2. Licensees must also pay a royalty rate, which is usually in the range of 4 pct to 10 pct. In Porter International, 5 pct and 6 pct are common.

3. Minimum annual royalties should be high enough to keep a licensee on his toes.

The normal duration of a license is 10 to 15 years, with provision for renewal. As a rule, any improvements developed by the licensee become the property of the licensor. Sometimes, an improvement developed by one licensee is made available to all other licensees.

Tin Costs 15¢ More Because of ITA

▪ The International Tin Agreement is costing the U. S. tin users about 15¢ on every pound of tin they use. This is the consensus of major U. S. tin traders.

The traders' estimates of what the price of tin at New York would be, all things considered, if it were not for the International Tin Council, ranged from 70¢ to 85¢ per lb. The average was 77.50¢ per lb. The current price is bouncing around 93¢.

Conclusion Valid — The group pointed out it makes little difference to them what the price range is, as long as the price moves. The ITC is pledged to stabilize prices. But it is considered inconceivable the price could be restricted to a range narrow enough to bother traders. They operate on fractions-of-a-cent margins.

The traders say further, that unless ITC shortens its sights and makes some key changes it could cause an artificial but damaging shortage of tin.

Under current ITC rules, producers must cut back exports by an average of 40 pct in the first half. Based on expected production of 154,000 tons in 1958, this would leave less than 100,000 tons of primary tin available if the regulation is extended through the year.

Total Supply—Russia is expected to sell about 12,000 tons of tin in the free world. And there will be some secondary metal available. Most traders agree the whole supply can't top 120,000 tons.

Since 1932 world consumption has dropped below this level only once, 114,000 tons in 1949. Consumption in 1956, last year for which figures are available, was 160,000 tons, according to the International Tin Study Group. Estimates put 1957 somewhat below this. And 1958 is expected to be very close to 1957.

Even considering stock on hand at users' plants, demand is sure to top 120,000 tons, say traders.

Numbers Flash From New Indicator

IN LIGHTS: Electroluminescent panels glow with letters and figures in a new display system just developed at Westinghouse.

▪ Numbers in lights, without the bulky equipment associated with illumination, are the result of a new technique developed at the Westinghouse Research Laboratories.

The device, technically an "electroluminescent digital indicator," displays numerals or other symbols on a thin, flat, glowing screen. It is bright enough for broad daylight, and is said to be the first such instrument built entirely of solid slate elements.

Advantages Cited — "A digital display screen has advantages over conventional methods of displaying material information, particularly where speed and accuracy of reading is important," cites Dr. E. A. Sack, manager of the laboratories' dielectric devices section.

"There are no dials to watch, no markings to estimate in order to get the exact reading," he points out.

One advantage of the screen is that most of the screen is active in displaying the information. By comparison, only a small part of the face of a meter or dial is active in giving the desired reading. This points to obvious use possibilities of the screen in recording data exactly, clearly, and instantaneously.

How It's Made—The digital indicator is essentially a flat screen having a series of phosphor-coated electroluminescent strips which glow when they are energized electrically. Seven such strips will form any number from 0 through 9; 21 strips, switched in and out of the circuit, will display any number from 0 to 999. By a different design, a screen with 14 segments can display any letter from A to Z, and, in addition, show numerals 0 through 9.

Because of their small size and other characteristics, transistors have been used as switching elements for the digital indicator. Size is limited only by manufacturing conveniences. One foot square panels are already available.

"While military and other nonconsumer applications will most likely materialize, an electroluminescent display of this type could have many interesting and useful everyday applications," Mr. Sack reports.

Some possible applications are speedometer, oil pressure, temperature and generator readings in an automobile.

Westinghouse research scientists have already employed the indicator experimentally to display the pressure readings which will exist inside the boiler of a nuclear power plant. Range of uses is certain to widen.

Business Letters Can Be Costly

Typing Service Eases Stenographic Problems

Business firms are finding a new way to slice costs of handling correspondence.

Dictated letters are picked up, typed, proofread, and returned in 24 hours ready for mailing.—By G. G. Carr.

▪ "Put it in writing" is a business byword. And it's being practiced more and more. Paperwork seems to be the No. 1 problem with most executives. It rankles even more when they find out what it costs.

Meeting the need to lower paperwork costs, a new type of typing service is growing up around the country. Unlike conventional letter shops, which mass produce form letters by a variety of methods, the new services are geared to handle individual correspondence of all types—letters, memos, reports, etc. —on a 24-hour basis. And they can show substantial savings to their customers in the process.

Pickup and Delivery—The operation is simple. All material to be typed is dictated on recording equipment of any type. If the customer does not have dictating equipment, the typing service furnishes it free. Conversely, the service will install transcribing equipment in its own shop to match the customer machines. At a specified time each day, the service picks up the filled tapes, belts or records. Within 24 hours, the typed and proofread letters are returned for signature and mailing. Or the service will sign and mail if desired. All work is done on the company's own forms and stationary.

The services, while guaranteeing neatness and accuracy, center their sales pitch around the cash savings they offer. Tycoon Typing Co., New York, one of the first in the field, points out that a $70-per-week typist costs her company $303 per month in base salary alone, excluding vacations and fringes. And in the nature of things, much of her 40-hour week is not spent on the typing for which she is hired basically. For the same $303 per month, Tycoon will produce 80,000 accurately typed words a month, or 533 letters of 150 words each.

No Quantity Limit—There is no limit on number of pieces of correspondence; charges are on a thousand-word basis. At 533 letters, this yields a per letter cost of $0.568 per letter. For shorter letters the unit cost is naturally lower.

Tycoon's customer list reads like a cross-section of top New York corporations. Since paperwork is almost the common denominator of business, the service feels there is no kind of company which is not a prospect. And it reports that similar firms in other large cities are having the same experience.

Minimum Monthly Charge—Typing services of this kind generally charge a minimum monthly rate—for Tycoon it is $100 per month for 20,000 words. Additional work is billed at $3.50 per 1000 words. Because of regional variations in clerical costs these figures probably vary somewhat from city to city.

While estimates are hard to come by in this area, it has been computed in the past that an average typist will do 24 letters per day including dictation. One line of the average letter contains 5 to 8 words, depending on the nature of the material. Tycoon reports that special vocabularies, trade terms and the like pose little if any problem, although it's often necessary to prove this to skeptical customers.

While this type of service has so far been confined to larger cities, there is no doubt that it's spreading. And it should soon be available in most business communities of any size where the amount of work available would justify setting up such an operation.

How Much Does the Average Letter Cost?

▪ You probably didn't realize it but that business letter you dictated this morning cost you quite a bit.

The average letter, Tycoon Typing Co. estimates, can easily cost more than $1.50.

Labor is a big factor, responsible for two-thirds of the total expense. Included must be the salary of the boss dictating and of the secretary processing the correspondence. And since a secretary's pay is generally proportionate to the boss's, the total charges can be formidable.

Other expense, too, must be pro rated to the cost of writing business letters. Office space, estimated at 40 sq ft of desk space per typist, is one. They are also the costs of typewriters and office furniture.

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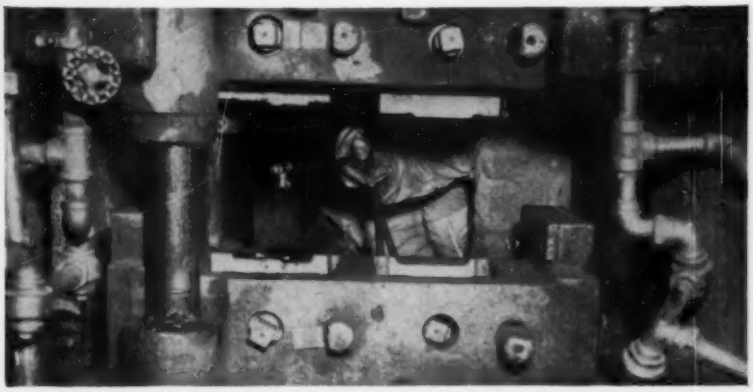
COLLOIDAL GRAPHITE PROVES IDEAL AS FORGING LUBRICANT

Lubricants to be suitable for use on forging dies for steel and nonferrous metals must be stable under the high temperatures and pressures involved. Besides providing the most effective lubrication for hot-work dies, 'dag' brand dispersions act as coolants. Total advantages gained by using Acheson colloidal graphite, as described in the following applications are: improved quality of the forging, reduced die wear, lower production costs, and improved working conditions.

'dag' dispersion improves quality, cuts costs for Utica Drop Forge and Tool Division. With a large share of their capacity being devoted to the forging of jet engine blades, Utica finds it must maintain high production, consistently high quality, and a competitive price. Blade-forging dies have a comparatively short life due to rapid wear caused by the thinness of the blades, the high pressures required to form the heat-resistant alloys used, and the closer tolerances required. They have found that *every one* of these requirements can be met by using 'dag' colloidal graphite dispersed in water as their forging lubricant. First, it must withstand temperatures which range from 1950-2200° F. Sprayed on both halves of the die it forms a tightly adhering, smooth, microscopically-thin film that aids metal flow and substantially protects the die itself. In many cases, this has meant fewer finishing operations and therefore higher production, due to the improved quality of the blades. A compressor blade formerly required four blows from upset to finish, with an intermediate heat and tumbling operation. Now, this operation is done in only two blows from original heat. The savings . . . $16,000 a year on this part alone! Add increased life of these precision dies and you can appreciate what a 'dag' colloidal graphite dispersion means to efficient forging. Utica finds water-based dispersions best for press forging, and colloidal graphite in oil the best lubricant for hammers.



Operator spraying colloidal graphite on both top and bottom die halves before forging jet engine blades at Utica Drop Forge and Tool Division. Kelsey-Hayes Company.

Concentrated Acheson colloidal graphite being applied to die surfaces before they are put in service.

Pre-treatment and operational use of 'Aquadag' greatly increases die life. Before putting dies into service, a prominent midwestern manufacturer finds that by preheating them to about 250° F. and brushing on a dispersion of colloidal graphite in water, they have generally *doubled* the working life of their dies. When used as an operational lubricant, die wear on a truck body brace die was proved by actual measurements to be only *one-third* the former rate. And this was with 'Aquadag' diluted 1 to 240 in water! . . . Ample proof of the wide coverage, film toughness, lubricity, and basic economy of a "dag' brand dispersion.

Colloidal graphite is resistant to heat, does not react with the die steel, and the extremely small particle size permits an actual adsorption to the metal surface. A water carrier eliminates the usual smoke and fumes thus affording better working conditions and keeping die temperatures down. After the carrier evaporates, a dry graphite film remains which, besides being an efficient lubricant, protects the die from the accumulation of abrasive dust and scale. Die life is extended from 8 to 14 days and production increased by the reduction in downtime.

Specially compounded, ready-to-use forging lubricants containing 'dag' colloidal graphite are available from industrial lubricant suppliers. If you have a forging lubrication problem, it may pay you to call in your Acheson Service Engineer.

Write for additional information contained in Acheson Bulletin No. 426. Address Dept. IA-28.

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More Scrap Will Go By Truck, Boat

▪ New scrap freight increases, which went into effect Feb. 15, are goading dealers and their customers into giving trucks and water transportation another look.

The rail raise, approved by the Interstate Commerce Commission, increased rates 40¢ per ton between points with an established rate.

Institute Opposed—The Institute of Scrap Iron and Steel is challenging the move. It is seeking to bring about voluntary cancellation of the increase in Western Trunk Line territory, Southwestern territory, and Southern territory. The ISIS protested and won cancellation of some proposed higher rates, including a proposal to increase industrial switching charges by 20 pct. ICC allowed a 5 pct increase.

Truck potential for scrap is still limited to relatively small quantities and short distances. Truck trailers carry about 15 tons and a railroad car about 40 tons.

Steel mills, with few exceptions, insist on rail shipments. They are set up for it, and dislike the heavy truck traffic for large scale shipments. Trucks call for immediate inspection and unloading, while rail cars can be accumulated. But in a tight market most will accept trucks.

Best Possibilities — Cost conscious foundries are the best immediate candidates for a switch to trucks. Inventory investment is now a big foundry item. In today's depressed operations, many smaller foundries would prefer to buy a 10-ton truck load of scrap rather than a 40-ton rail car.

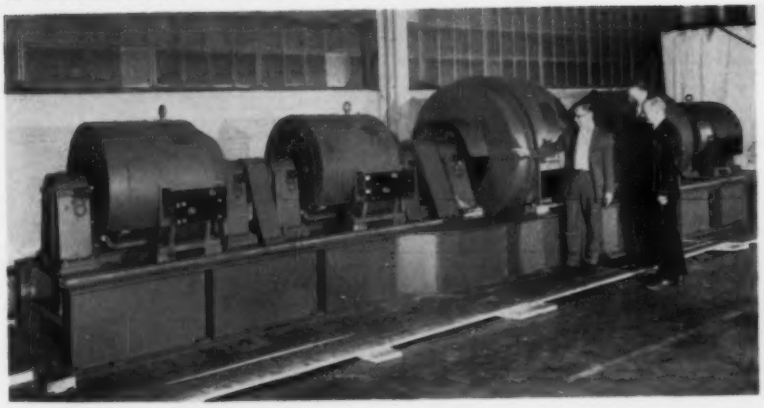
A Cleveland scrap broker says, "We are arranging more and more truck deliveries of scrap daily because of increasing rail rates. Dealers with their own trucks are making more and more direct deliveries."

Great Lakes area scrap shipments by water this year are expected to increase. And when the St. Lawrence Seaway is open, scrap dealers expect to compete with Eastern seaboard points for export tonnage.

Water Shipping — There are about 13 Great Lakes vessels equipped to handle scrap between any two points on the lakes. All are self loaders with booms for magnets, buckets or slings. About 5000 tons of scrap can be loaded or unloaded in 48 hours. The biggest single vessels are two 10,000 ton capacity boats operated by Ore Navigation Co., a Bethlehem subsidiary.

Cheap water rates give shippers a tremendous leverage against rail rates. For example, Chicago water rates to Buffalo are $4.55, plus $2.55 to $2.80 for loading and stevedoring. Comparable rail rate is $12.90.

Destination: Power for a Steel Mill



BIGGEST: The largest motor-generator ever made by Reliance Electric and Engineering Co., Cleveland, is inspected by F. R. Terrant, manager of engineering, Ivanhoe Div.; Hugh D. Luke, vice president, Ivanhoe, Div.; and William R. Hough, vice president of engineering. The 1500-hp. ac drive motor turns four dc generators rated at nearly 1000 kw. The 40-ton unit is ready for shipment to a steel mill near Gary.

Power Project Setback

A $50 million hydro-electric metallurgical project in Northern British Columbia has had a setback.

Allan J. Anderson, president of Frobisher, Ltd., project promoter, says his company can't go ahead with the program until population gains make the power market more attractive.

The company had planned to spend $200 million for development of the Yukon River headwaters. But it cut the amount and moved the project downcoast to the Naas River area.

Mr. Anderson says, "We can't parcel the power up and send it away; and at the moment there's no market for it in Northern British Columbia." While there is much power potential in the region, "it is proving expensive to develop."

Heat Treating Stainless

Jones & Laughlin Steel Corp. has installed a new continuous heat treating and normalizing line at its stainless steel plant in Detroit.

The new installation is aimed at producing stainless bars in a closer range of hardnesses. Grades to be treated include Types 403, 410, 416, 431, 420, and 440.

Installation and engineering was handled by The Drever Co. The 100-ft line can treat bars from ½ in. to 4½ in. in lengths to 30 ft.

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BRIDGEPORT "DEEP LUSTER" BRASS STRIP REFLECTS THE QUALITY OF YOUR PRODUCTS

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In addition to its exceptionally fine surface, Bridgeport "Deep Luster" Brass Strip has remarkable uniformity of gauge and mechanical properties from edge to edge and from end to end. It's available in long-length coils for more economical production.

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Bridgeport Brass Company, Bridgeport 2, Connecticut
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Frederick H. Klein

A Boilermaker Tells His Story

You would hardly expect an established industry such as boilermaking to undergo much change.

Yet here is a man whose company has had remarkable success with a new manufacturing concept.

FRED H. KLEIN: Quality comes in packages.

• When anyone asks Frederick H. Klein what he does for a living he likes to say, "I'm just a boilermaker." Actually, he is president of Orr & Sembower, Inc.—a leading producer of packaged automatic heat exchange equipment.

The concept of "packaged" industrial equipment has given direction to Fred Klein's administrative talents since he joined Orr & Sembower as vice president and purchasing agent in 1939. His company was one of the first to come out with a packaged boiler before World War II.

New Approach Needed — Mr. Klein defines packaged equipment as a complete unit built, tested, and guaranteed by a single manufacturer. It's opposed to the practice where a purchaser buys separately a number of individual components for assembling his own unit.

To keep up with demand that has been growing during the past 20 years, and to carry out its promise of single manufacturer responsibility, Orr & Sembower had to revamp its thinking.

The Answer—"We found we had to train a nationwide service and sales organization to 'think' packaging," explains Mr. Klein. "And we had to do it in a way that wouldn't cut down on productive time in the field."

The answer was to send field personnel to school. The company established the Orr & Sembower Service School which has become well known throughout the boiler industry.

Five-Year Planning—The school basically consists of a series of two-week shirt sleeve sessions each summer at the plant in Reading, Pa. Several one-week refresher courses are held during the year for experienced men. "Students" come from as far away as Australia, India, and South America. A traveling service school recently was started.

But the success of Orr & Sembower's package deal doesn't rest entirely with the service school. Mr. Klein set up an extensive research and development operation at Reading. "We're always thinking five years ahead of our product," he says. "We've got to or we'll end up losing our share of the market."

Credits Salesmen—He attributes at least part of the success of his R&D program to his salesmen. "A good sales force is the first line of communications with the customer," Klein explains. "We can get a better idea of what a customer thinks of our product and what he wants to see improved. Then R&D goes to work."

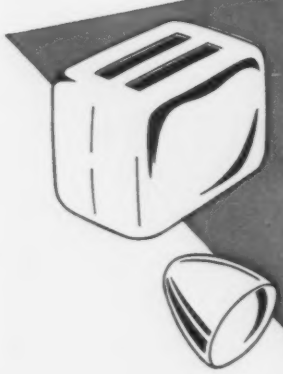
Born in Poughkeepsie, N. Y., Fred Klein is a leader in Berks County, Pa., business and civic life.

J&L

RESTRICTED SPECIFICATION COLD ROLLED STRIP STEEL

Serves Typical Low Carbon End Use Requirements Such as these . . .

SIZE	8 x .045
ANALYSIS	1010
FINISH	#2 finish
HARDNESS	Non-Scalloping quality
THICKNESS TOLERANCE	± .0005 incl. crown
WIDTH TOLERANCE	± .005
COIL SIZE	250# per inch of width
PACKAGING	Skidded



SIZE	12 x .832
ANALYSIS	1010
FINISH	#3 finish
HARDNESS	#4 Temper
THICKNESS TOLERANCE	± .0005 incl. crown
WIDTH TOLERANCE	± .005
COIL SIZE	up to 200# per inch of width
PACKAGING	Paper interleaved—skidded and shrouded

SIZE	4 x .065
ANALYSIS	1010
FINISH	#2 finish
HARDNESS	#3 Temper
THICKNESS TOLERANCE	± .0005 incl. crown
WIDTH TOLERANCE	± .005
COIL SIZE	Cut lengths
PACKAGING	Skidded

Many times, by varying processing methods, J&L is able to develop properties in cold rolled strip steel which greatly facilitate production operations and/or give the product superior qualities without adding to end product cost. End result is lower costs through improved products or better assembly and improved yield.

We believe you will find it worthwhile to investigate the possibilities of J&L Restricted Specification Cold Rolled Strip Steel applied to your production.

THE 4 IN 1 SOURCE FOR YOUR COLD ROLLED STRIP STEEL

Now there are four J&L plants with facilities for production of "Restricted Specification" cold rolled strip. Strategic locations at Youngstown, Indianapolis, Los Angeles and Kenilworth, N. J., provide the security of 4 sources of supply plus the close working relationship which these local production centers make possible.

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FORMERLY THE COLD METAL PRODUCTS COMPANY

J&L STEEL

Not All Are as Cheerful as Ike

Talk about an end to the downturn late next month doesn't arouse universal optimism.

Most businessmen are confident of the long-term growth, but they are going to be very careful until more tangible signs of an upturn really appear.

▪ The business world has seldom heard as much "chin up" talk as the flow that came out of Washington last week.

Everybody in the Administration from the President on down is now on record predicting an upturn in the late spring. All this was bolstered by the President's "Fact Paper" on what the Federal Government is doing to ease the recession.

Lots of Evidence—On the face of it, it is quite a bit: Moves to spur housing, highway expenditures, increased defense spending, easier money, and others; not to mention the post office rejuvenation program.

In the absence of very little encouraging news from within the business world itself, government moves to help stem the downturn now have assumed the dominant position in the economy.

Tax Cuts Possible—In fact, most economists now agree that business will not snap out of it without strong government action. A hard core of these believe that even stronger action than is now in evidence will be necessary to spark an upturn.

The ace in the hole of government business interventionists is now the possibility of a cut in Federal income taxes. In contrast to the attitude of a few years ago, there is little objection in Congress or from business to the prospect of deficit spending, if it will help halt the recession.

Later Than Ike Thinks—In spite of all this, it's difficult to see much evidence of a pickup until later than President Eisenhower indicates. It should be noted, however, that he only predicted "the beginning of the end of the downturn" in late March. That is not exactly extreme optimism, if taken literally. Nevertheless, his overall tone was one of definite encouragement.

The average businessman now wonders how much confidence to place in government measures to end the downturn. Basically, he would rather place more trust in his own sales forecasts and market reports.

Close to the Vest—Most businessmen are fully and completely convinced of the overall growth pattern of the economy. But for the rest of this spring and into the summer, they are going to play it on the short term basis.

This involves the risk of being left at the start when things get moving again.

Can You Call the Upturn?

Crucial Period — The critical problem now is how to spot the upturn. At this time, some sets of statistics can be of increased value.

New orders, inventories, backlogs, rate of sales and some others have been designated as "lead" statistics. They have the advantage of being objective. For example, the economists came closer than salesmen in calling the turn in the recent dip. In this case, optimism still reigned after some of the signs of a downtrend were in evidence.

Can Be Wrong—But statistics can be misleading. This is generally because they do not reflect special conditions that may result in erroneous interpretations of the figures involved.

Another problem of statistics is that they may be late. In a sharp upturn, or downturn, you can't wait for your monthly "Survey of Current Business" to tell you that things have taken a sudden turn.

The steel operating rate, for an example, can obscure wide variations in orders and shipments.

Industry Barometers — Sometimes, cold statistics have to be discarded. One steelman, for example, has no figures to prove it, but experience tells him inventory cutting will have to end between April and October. He predicts a good pickup in that time.

In your own industry, there are certain products that in the past have proven to be barometers. You will have to keep a close eye on these in the current period.

Personal Knowledge—Most companies rely heavily on personal evaluation to back up their statistics. Trips into the field are valuable. Reports of conditions in the field are increasingly valuable at times like this.

There is no such thing as an exact method of predicting trends. For some reason, it's much more difficult to spot an uptrend than a downtrend.

UAW Labor 'Court' Makes Good

Bench Guards Members' Rights, Aids Management

The Public Board of Review is less than a year old but it has made some weighty decisions.

It probably will become a permanent part of UAW International.—By H. R. Neal.

▪ One of labor's unique experiments has developed beyond the research stage and seems likely to become a full-fledged success before long. While union members and the labor movement stand to benefit directly, there are indirect benefits for management, too.

Less than a year ago the International Union, UAW, created an intra-union "supreme court," the Public Review Board. Today the board is actively engaged in its task of looking after labor's house. All of the ground-rules haven't been finalized, but PRB is progressing in a remarkably swift and efficient manner.

Its Makeup — A seven-member tribunal is drawn from three morality-shaping institutions — church, school and judiciary. Chairman of PRB is Rabbi Morris Adler, Detroit.

Cementing the board together is a Detroit-based executive director, Walter E. Oberer. Mr. Oberer is not a member of the board, but as the only full-time employe (plus secretary), he has the gigantic task of seeing that a good idea becomes a practical, working program.

He looks at the PRB's function as "protecting the little fellow against the big group." He explains that the union, like any large group of society, is not infallible in its dealings with individuals or smaller segments of the group, such as a local. This, he feels, is particularly true where politics is involved.

Busy Calendar — Some of the pending cases will give an idea of where PRB is getting its feet wet.

One involves an appeal by local officials deposed by the International Union for failing to abide by directives concerning election of delegates to a convention. The International claims the directives were designed to insure a democratic election would take place. The local's deposed executive board contends the International overstepped its jurisdiction and wants back in.

Collusion to Libel — Another case on the docket involves the charge of collusion between a local and plant management in the firing of an employe. In its review, the International executive board claims it found discrimination exercised by the local and ordered it to pay back-pay to the discharged employe. The local has balked and appealed to the PRB.

Still another case involves a libel

Getting Ready for Night Driving

ELECTRONIC AIM: 1958 Cadillac coming off assembly line has its headlights checked electronically. Light beams are directed into photo electric cells, then adjusted until dials indicate prescribed density.

1st Choice

For Versatility and Adaptability

BULLARD Hydra-Feed Lathes

Rough forging of front axle spindle SAE #1037 Steel, Brinell Hardness 31-32 on the C scale.

The Senior Engineer at one of the leading motor car manufacturers in Detroit, was looking for a tracer lathe that went beyond his immediate requirement and offered easy conversion to other uses in years to come, to give longest tool life, to do the job with a minimum of shutdown time, to handle future developments in the realm of cutting tools, to reduce scrap to a minimum.

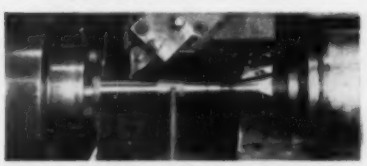
The answer to this multiple problem, according to the Senior Engineer was "BULLARD HYDRA-FEED TRACER LATHES."

We invite you to investigate the advantages which Bullard Hydra-Feed Lathes, either tracer or multiple tool models, offer you. Phone or write your nearest Bullard Sales Office, Distributor or

THE BULLARD COMPANY

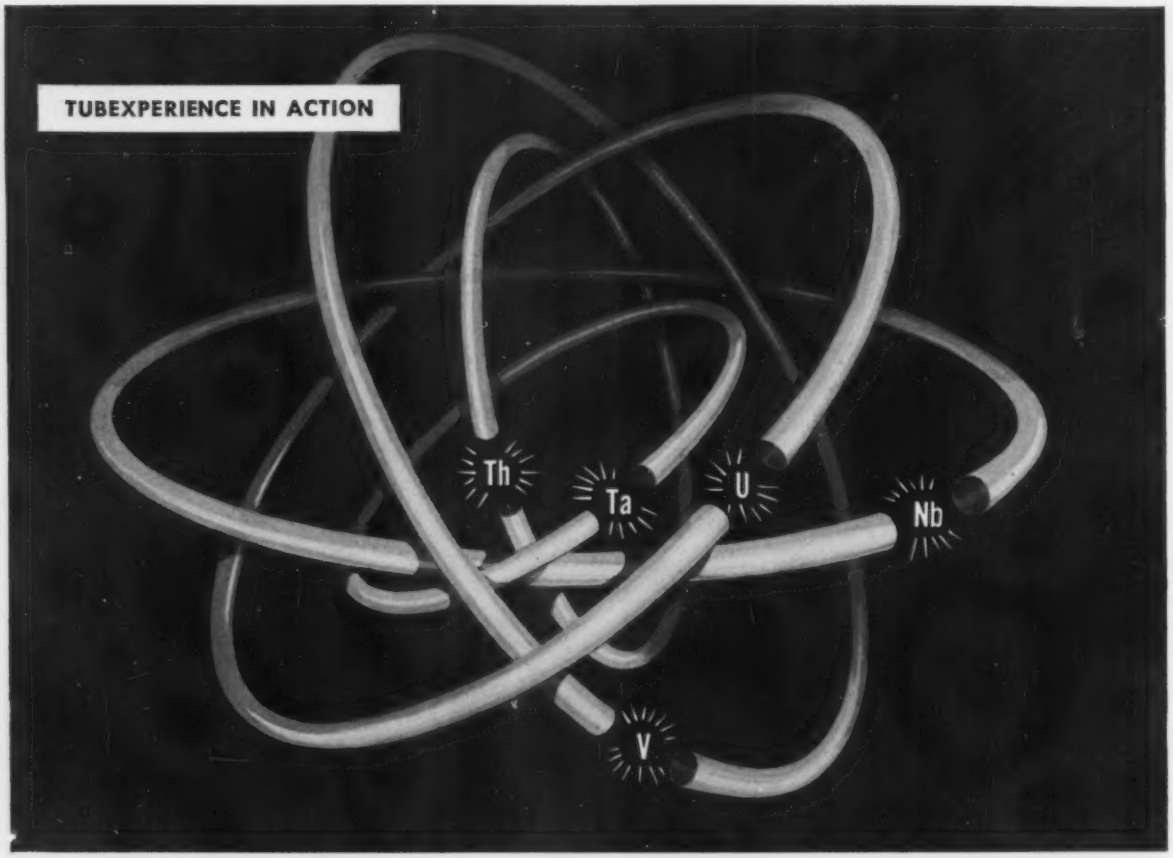
BRIDGEPORT 9, CONNECTICUT

Rough turning with Rear Tracer Slide.



Finish turning with Right-Hand Top Tracer Slide

Finished piece complete cycle time — 65 seconds.



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PROOF:

- *Superior has supplied millions of feet of tubing for atomic applications to many of the key manufacturers in the atomic field.*
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. . . And Superior has produced all this tubing to exceptionally precise specifications and tolerances!

Put Superior's experience and facilities to work for you! Superior has drawn most of the reactive metals, as well as stainless steels, nickel alloys, ingot iron, and Inconel, for important nuclear applications.

The end uses for Superior tubing in atomic energy include control rod tubing, fuel element tubing, tubing for moderator and shielding cans, process lines for handling radioactive liquids, and tubing for handling facilities.

NOTE: In some cases, tubing can be produced only with AEC release, because of priorities on materials.

If you are in or serving the atomic industry and need small tubing, this store of experience can be of great assistance to you. For information, write Superior Tube Company, 2004 Germantown Ave., Norristown, Pa.

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The big name in small tubing

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All analyses .010 in. to ⅜ in. OD—certain analyses in light walls up to 2½ in. OD

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Automotive Production

WEEK ENDING	CARS	TRUCKS
Feb. 15, 1958	101,229	18,164
Feb. 16, 1957	145,846	24,113
Feb. 8, 1958	109,028	19,481
Feb. 9, 1957	147,163	22,957
TO DATE 1958	700,000	120,900
TO DATE 1957	961,900	145,400

*Preliminary Source: Ward's Reports

suit growing out of an election campaign. The UAW constitution forbids one member to seek civil redress against another, in matters growing out of union activities, prior to exhausting the union's appeals procedures. The sued member won't pay, claiming the suit was illegal.

Decision on Ex-Reds — Other cases are in various stages of processing for hearing before the Public Review Board. In handing down decisions on its first 10 cases several months ago, six of the seven board members formed the court. The cases involved five union officials who had taken the Fifth Amendment before the Senate Internal Security subcommittee. Five union representatives called on the First Amendment concerning alleged Communist activities in the past.

All are clear of present Communist ties. Local executive board hearings approved them for holding union offices. The question: Can ex-Communists hold union office? PRB found the action was "consistent in spirit as well as in letter, with the AFL-CIO Ethical Practice Code," as the board was unable to find anything barring former Communists from office.

Management's Stake — It's true the cases are of peculiar interest to the unions and union members. But Mr. Oberer points out disgruntled or warring factions within a union can make it very difficult for plants to operate effectively or, in some cases, at all. The pursuit of personal grievances may carryover to the job, and management would be powerless to do much about it.

As PRB gains experience in this field of labor justice, it will also speed up the disposition of cases. Tentative rules of procedure have been adopted, outlining the who, how, what, and where of appealing to PRB.

Distance Is Problem—Right now, geography is a minor obstacle to be bridged before PRB is operating smoothly. The PRB members are scattered across the nation. Msgr. George C. Higgins and Bishop G. Bromley Oxnam are in Washington, D. C. In addition to Rabbi Adler, Judge Wade H. McCree is located in Detroit. Magistrate J. A. Hanrahan is from Windsor, Ont., Dr. Edwin E. Witte is located at the Univ. of Wisconsin, at Madison, Wisc. And Dr. Clark Kerr is Chancellor of the Univ. of California at Berkeley.

Three-Man Quorum — While geographical dispersion limits the board's working together at the beginning, it should help speed hearings in the future. Only three members are required to constitute a panel. And the smaller panels, expected to dominate the hearing procedure, are more mobile and readily formed than a full board.

Mr. Oberer summed up PRB's accomplishments to date. "We're beginning to see our job crystallize. As we gather experience, we'll become more efficient—and more effective. But there'll still be a lot to pioneer in this field for years to come."

Dodge Adds Six Cylinder Model

Popularity of six-cylinder engines has prompted Dodge to add an additional model to its line — a Coronet two-door Lancer hardtop. Dodge is the only automaker in the medium price market offering a six as well as V8 engine.

Dodge vice president L. F. Desmond explained "people who purchase the six-cylinder models seem to have a primary interest in economy," citing lower initial cost and operating expense. He said the new model will be offered only with an automatic transmission — a slightly less economical option selling for about $200.

THE BULL OF THE WOODS

OH, DAVE--I GOT SOME GOOD NEWS FOR YOU! I JUST GIVE YOUR BOY A JOB AN' I'M GOIN' TO PUT HIM ON AS YOUR HELPER!
HA-HA--THEY LIKE OL' DAVE HERE AN' TH' BULL O' TH' WOODS THINKS HE'S DOIN' HIM A FAVOR, BUT HE AIN'T! IF YOU CAN'T GET ANY HELP OUT OF A SON AROUND TH' HOUSE, HOW YOU GONNA GET ANY OUT OF HIM HERE?
WELL, TH' OL' MAN'LL EARN BOTH PAYS AN' TH' SON'LL SPEND ONE OF 'EM--BUT, AT THAT, IT'LL BE BETTER'N IT WAS, WITH TH' OL' MAN EARNIN' ONE PAY AN' TH' SON SPENDIN' HALF OF IT!
THE HANDICAP
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Forget about Variable Lot Sizes...

Cincinnati Knee-Type Millers with Automatic Table Cycles will handle the job

Costs get a double-barrel blast from CINCINNATI® Knee-Type Milling Machines equipped with automatic table cycles. They combine many outstanding toolroom and production milling features . . . they are equipped to machine one part or several hundred at the lowest possible cost.

For small lot production, Cincinnati features are tops . . . directional controls; wide range of speeds and feeds selected in a few seconds; automatic disengagement of hand cranks when power feed is engaged; an excellent choice of attachments and accessories.

And for large quantity production, Cincinnati gives you the following additional advantages . . . automatic table cycles; 150 ipm rapid traverse; automatic backlash eliminator.

Except as indicated below, the foregoing features are standard. They're common to plain and vertical styles of the three lines shown in the spec table. Get more information by looking in Sweet's Machine Tool File, or ask for the catalogs mentioned below.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

LOT SIZE . . . *one*

LOT SIZE . . . *hundreds*

*ML and MI Group	3 to 7½ hp main drive	Catalog No. M-1995
*Dial Type Group	10 to 20 hp main drive	Catalog No. M-1915-2
High Power and Dual Power Dial Type Group	15 to 50 hp main drive	Catalog No. M-1917-3

**Dial Type and ML and MI Milling Machines are sold with or without automatic table cycles.*

CINCINNATI® MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS • SPECIAL MACHINE TOOLS • METAL FORMING MACHINES HARDENING MACHINES • CUTTING FLUID • GRINDING WHEELS

Be Patient, FRB Head Advises

Martin Sees Early Business Recovery

FRB chairman still holds to his tight money philosophy and warns against new inflation.

He is confident of a new upsurge of business in late spring. —By G. H. Baker.

▪ The nation's top money manager warns that a new round of inflation is taking shape.

William M. Martin, Federal Reserve Board chairman and a leading spokeman for hard money, advises that new inflationary forces are now at work, despite sagging industrial output and soft prices of many industrial commodities and products.

Be Patient—Martin is warning the Congress against over-stimulating the economy at this time. Overzealous application of credit stimulants will only bring on another burst of inflation, he predicts. He believes that the recent softening of money rates is already acting to awaken business activity, but the "awakening" is not apparent on the surface. Be patient, he tells Congress, and production and sales will begin to rise before the end of first half 1958.

What's wrong with the economy now is a kind of "indigestion or overexertion" after three years of boom production and sales, as Martin sees it. And he firmly declares that "nothing can stop the economy from recovering and resuming its growth, except mishandling of the patient by shooting him full of hypodermics and drugs."

New Peaks Ahead — Outlook, both for the short-run and long range, is for a "very strong and robust economy," he believes.

This optimistic talk doesn't faze some leading Senate Democrats, however. Senator Pat McNamara, D., Mich., who usually expresses the AFL-CIO view, is demanding an increase in personal income tax exemptions from $600 to $800.

A Boost From Post Office Program

The new White House program for building new post offices will pump more than $2 billion into orders for structural steel, building materials, and late-model mailhandling equipment.

The Eisenhower Administration intends to press Congress for approval of the huge spending program regardless of whether or not Congress okays the higher postal rates needed to offset the increasing losses incurred by the Post Office Department.

Erection of new post offices and installation of new mailhandling equipment is to extend over a five-year period.

The huge construction program is expected to add substantially to payrolls in the construction industry. The Administration, worried over rising unemployment (4.4 million, nationwide, this month), believes this new post office construction program and other public works programs now being drawn up will go far toward injecting new zip into the currently tired production and sales pictures in a number of industries.

Will GM Be Asked to "Spin Off"

Laws Unlikely — There is little chance that Congress will write any new laws this year to break up the larger auto companies. But don't overlook the possibility that the Justice Dept. may succeed in persuading General Motors voluntarily to spin off one or two of its subsidiaries.

Any new laws to force split-ups in the corporate structure of GM or Ford are simply not in sight as long as there is some degree of competition in auto sales.

Big Two?—But if the "big two" succeed in erasing their small competitors, you can then expect Congress to order the remaining giants split up into separate, unconnected companies.

The Justice Dept. for some months now has quietly been trying to persuade GM to divest itself of some subsidiary corporations. Thus far, there is little evidence that GM is impressed by the government's arguments.

Possible Approach — There's a wide range of opinion within Congress as to which GM subsidiaries —if any—are to be sold and reorganized as independent companies. Sen. Kefauver, for example, charges GM has expanded "unhealthfully" into "numerous, unrelated types of businesses." He favors a big split-up. But Sen. O'Mahoney, D., Wyo., another anti-big-business lawmaker, says he would make GM get rid of only GMAC, the finance company. The producing units should be left alone, O'Mahoney contends.

Here's what U. S. Steel Supply's **ANY STEEL ANYWHERE ANY TIME SERVICE** means to Specification Steel Corp.

"U.S. Steel Supply Service has helped us CUT INVENTORY COSTS 70%"

says **Ray N. Stephens,** *president and general manager, Specification Steel Corporation*

"We have reduced our on-hand inventory more than 70% by dealing with U. S. Steel Supply," says Mr. Ray N. Stephens, president and general manager, Specification Steel Corporation, Colton, California.

"Two years ago we maintained an on-hand inventory of 630 tons of assorted shapes and sizes of structural steel, plus considerable sheet and bar stock," says Mr. Stephens. "This space-eating inventory required a huge investment of over $100,000, which meant that less working capital was available for plant expansion and efficient production.

"Because of U. S. Steel Supply's ability to deliver what we want . . . when we want it," continues Mr. Stephens, "we now carry less than 30% of our former inventory—and the working capital, previously tied up in plant inventory, has been channeled into increased production facilities and accounts receivable requirements."

Steel fabricators, such as Specification Steel Corporation, have found that by using ANY STEEL, ANYWHERE, ANY TIME SERVICE it is actually *less expensive* to buy from U. S. Steel Supply.

Here's how to put this service to work for you!

Your steel needs, regardless of your location, can be handled immediately and accurately by U. S. Steel Supply's ANY STEEL, ANYWHERE, ANY TIME SERVICE. You'll get money-saving, time-saving and problem-solving benefits when you deal with U. S. Steel Supply, *plus* the invaluable experience of our technical people and our sales representatives.

If you want one of our representatives to help you plan for new efficiency, new economy and new profitability in your future steel buying, write to U. S. Steel Supply at the address listed below.

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DIVISION

Mailing Address:
P. O. Box 1099, Dept. E2, Chicago 90, Ill.

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General Offices:
208 So. LaSalle St., Chicago 4, Ill.

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UNITED STATES STEEL

Why Arizona Wants a Steel Mill

Area "Imports" Quarter Million Tons a Year

Arizona is a growing market for steel products, especially bars and shapes.

Location of a rolling mill in the state would be welcomed by steel users.—By R. R. Kay.

■ Steel consumption in Arizona marks the area as a good potential site for a mill. Currently a quarter millions tons of rolled products a year—brought in from the outside—are being used. Therefore a local steel mill should find plenty of customers.

But what size and what kind of plant? An electric furnace with an annual capacity of 60,000 tons would seem about right. Most likely products to start rolling would be merchant bars, concrete reinforcing bars, and light shapes.

Scrap Available — Right now, Arizona consumes 50,000 tons of these products. The need is sure to grow. By 1962, demand should be at a 60,000-ton-per-year clip for bars and light shapes. Neighboring Mexico, where there's strong demand for steel fence posts, also provides a good market.

Scrap is plentiful for a small mill. Arizona generated 83,000 tons last year; 88,000 are predicted this year. And in five years, the scrap available should top 100,000 tons. Autos, trucks, and buses make up almost half the total. The rest comes from steel fabrication and construction; agricultural machinery and equipment; and old mining equipment.

There's another good scrap source. Neighboring states provide 40,000 tons per year. That much moves through Arizona on its way to the major California markets. Arizona's scrap yards would benefit in a big way with a local mill. Rail rates to Los Angeles run from $8.20 to $10 per ton.

This year, about 70,000 tons—roughly 80 pct of Arizona scrap—will be carbon steel. By 1962, the tonnage should climb to over 80,000.

Market Study Made—Arizona is experiencing a five per cent gain in population every year. Last year's total of 1.1 million persons should hit 1.4 million in five years. As more people come, the need for more diversified products will follow.

A mill there could look forward to broadening its product line. In time heavier steel products such as structural shapes, steel plate, sheet, strip, pipe and fittings might be added.

The Arizona Development Board just finished an excellent study on scrap iron and steel, and steel markets. It covers estimated capital costs of a mill, and a product-by-product market analysis.

The study will aid steel mill operators and investors investigating the subject.

Nothing Thin-Skinned About This Bird

STRUCTURAL CHECK-OUT: Engineer at Convair Div. of General Dynamics Corp. measures growth rate of crack induced in fuselage test section of firm's 880 jet transport. Despite tremendous stress applied by hydraulic rams and by internal air and water pressure, there was no failure in the structure, even after the cut was lengthened from 4 to 20 inches.

Two Cap Screws . . . both the same length but one with a larger diameter than the other. If you were buying or specifying Cap Screws of this length, where maximum tensile strength was required, which would you choose?

Be careful! It's easy to jump to the wrong conclusion. Actually the Cap Screw with the smaller diameter is the best buy from every standpoint. It has greater tensile strength, costs less and makes possible a lighter, stronger assembly. Why? Because the smaller diameter Cap Screw is a Lamson & Sessions 1038 Double-Heat Treated Cap Screw while the other is the ordinary low carbon Full Finshed Cap Screw.

This is one of many instances where Lamson & Sessions can help you make the *right choice* when you have a fastener problem. As manufacturers of over 20,000,000 fasteners a day, backed by nearly a century of experience making fastener products, you can bank on Lamson salesmen and engineers to give you the right answers . . . *every time!*

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The Case for "Bargain" Tools

Extremes of Accuracy Are Not Always Needed

A market possibility may be lurking in numerically controlled tools that meet only "commercial" tolerances.

Extreme accuracy is expensive, and not always necessary. —By E. J. Egan, Jr.

▪ Is there a need for numerically controlled machine tools that won't cut metal to anything better than so-called "commercial" tolerances? Let's explore the question.

Most new machine tools that work by the numbers are touted for their speed and accuracy. In many cases the sales pitch bears down most heavily on the "accuracy" angle. "Repeat positioning to within 0.0001 in." is a common claim. It's not phony. Intricate servomechanisms, taking their orders from punched cards or tapes, will position tools or work tables with this degree of precision—and do it time after time.

Not Always Necessary—There's nothing wrong in the idea of combining speed with extreme accuracy in a numerically controlled tool. On the contrary, there's a great need for such equipment in many machining programs.

But accuracy to a ten-thousandth of an inch or a few seconds of arc costs money, more money, presumably, than many firms are willing or able to spend. Maybe a little less accuracy and a lower price tag would have a wider appeal. There are countless shops where machining tolerances of a few thousandths, or even a few hundredths of an inch, are good enough.

Do-It-Yourself Controls—There is some evidence to back up the idea of a good market for modestly-priced numerical control units that can be applied to existing equipment. One major electrical goods manufacturer recently wanted to use a very elementary form of tape control for drilling and tapping modest quantities of a number of different workpieces.

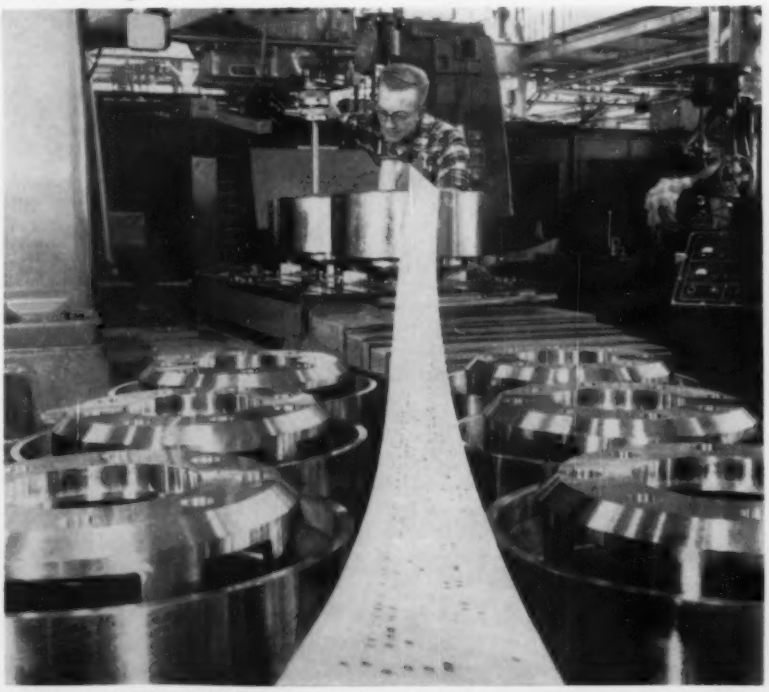
The firm couldn't find anyone who offered such a machine as a stock item. Nor could it find anyone who was interested in building the unit simply and inexpensively. So the company bought a turret drill head and a tape control unit. It welded up a machine base, stuck a work table on it and got busy drilling. The do-it-yourself rig works fine. It doesn't have jig borer accuracy but it does what it's supposed to.

AMTB Forums

A series of management forums will be featured at the 34th Spring Meeting of the American Machine Tool Distributors' Assn. on March 10 and 11, at the Hotel Roosevelt, New Orleans.

Four separate forums are scheduled to cover the following topics: (1) Sales and Service, (2) Administrative Management, (3) Manufacturers Relations, (4) Problems of Multiple-Line Houses.

No Margin for Error



FOR UTMOST PRECISION: Snow-Nabstedt Gear Corp. positions holes within 0.0001 in. with a tape controlled Pratt & Whitney jig borer.

INDUSTRIAL BRIEFS

Brush Buys Penn—The Brush Beryllium Co., Cleveland, producers of beryllium metal and beryllium alloys, has purchased the assets of Penn Precision Products, Inc., of Reading, Pa. Brush will continue operation of the precision strip producing facility under the name of The Pennrold Div. of The Brush Beryllium Co.

Wire Reinforcements—The Wire Reinforcement Institute has added two new members, Tennessee Coal & Iron Div. of U. S. Steel, and The Steel Co. of Canada, Ltd. The addition of TCI, and Stelco, adds 40,000 tons of capacity to the wire fabric industry. It raises to over 95 pct WRI members' share of all wire reinforcement produced in the U. S. and Canada.

Working Agreement—A working agreement designed to lead to the commercial development of new lithium-containing metal alloys has been formed by Lithium Corp. of America, Inc., Minneapolis, and Brooks and Perkins, Inc., Detroit. This agreement does not affect Brooks and Perkins' independent work in lithium - magnesium systems. It will continue, both independently and in conjunction with Lithium Corp.

"Sorry. He's positively not seeing anyone today!"

Ten-fold Increase — Federal-Mogul-Bower Bearings, Inc. will build a 23,000 sq ft $500,000 plant for its Microtech subsidiary. It will be situated in El Monte, Calif., and will increase manufacturing capacity more than 10 times.

Inland Experiment—Inland Steel Co. will build an experimental pilot plant at its Indiana Harbor Works for the smelting of iron ore by a new process. The new technique has been developed in the company's research laboratories. Details of the process were not disclosed.

Family Name — Atlantic Coast Industries, Inc., is the name agreed on for a nine-company group which includes Bridgeport Rolling Mills Co., Industrial Metals Corp., Brickseal Refractories Corp., and Fish Machinery Corp.

Ornamental Organization — The ornamental iron industry has organized the National Ornamental Iron Manufacturers' Assn. The association will advertise and promote the use of ornamental iron as a building and home improvement material. Local chapters will be organized.

Aeronautical Division — A. O. Smith Corp. has established an Aeronautical-Western Div. in Los Angeles. The plant is making aeronautical parts used by all of the armed services and equipment for the U. S. Navy and the navies of all the NATO countries. The plant started operation late in 1957.

Cores and Coils—Westinghouse Electric Corp.'s Manufacturing and Repair Div. will construct a new building on a 2½ acre site near Utica, N. Y. The structure is scheduled for completion in Oct. 1958. The plant will manufacture cores and coils used for the repair of distribution transformers.

Sale For Salem-Brosius—A gas fired, continuous roller hearth annealing furnace, with inlet and outlet tables and discharge mechanism is being built by Salem - Brosius, Inc., Pittsburgh. Ordered by National Tube Div. of U. S. Steel, it will be installed at the company's Ellwood City, Pa. plant. The furnace is designed for normalizing and cycle annealing alloy steel pipe.

Latest on Aluminum — A new alumnium chart, Sec. G, No. 1, is now available from Peter A. Frasse & Co., Inc., New York. It covers both minimum government specifications and information on the bending and forming of aluminum sheet and plate. It shows chemical analysis requirements for the most frequently used Federal Military specifications, and specified forms (sheet, bar, etc.) and the nearest corresponding ASTM, SAE and AMS spec numbers.

Trailer Transfer—Clark Equipment Co., manufacturer of materials handling equipment, has agreed to acquire all capital stock of Brown Trailers, Inc. The latter manufactures aluminum trailers and cargo van bodies. Purchase calls for the exchange of about 75,000 shares of Clark common stock for the outstanding shares of Brown stock. Net assets of Brown Trailers, Inc., and its subsidiaries are about $2.7 million.

Aluminum Award Emblem—Jose de Rivera, New York sculptor, has been commissioned to create the emblem for the second annual international R. S. Reynolds Memorial Award for the use of aluminum in modern structure. The emblem, plus a $25,000 honorarium, will be awarded to an architect by the American Institute of Architects convention this July in Cleveland. Award is based on the most significant contribution to the use of aluminum in the building field.

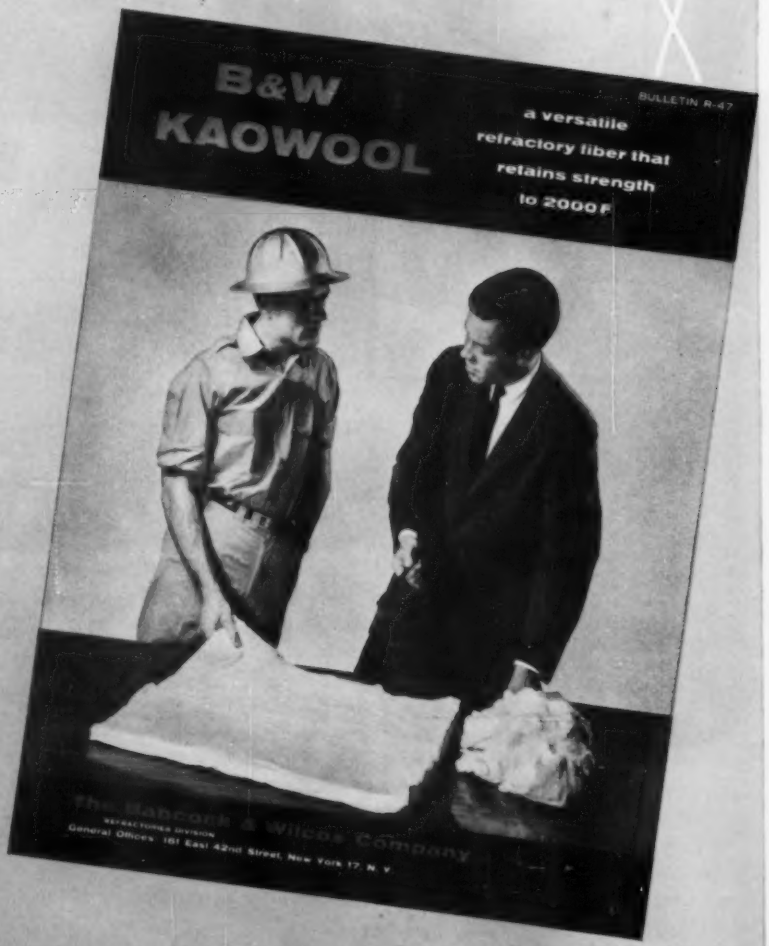
Automatic Warehouses — Pesco Products Div., Borg-Warner Corp. has formed Pesco's Automatic Warehousing Branch. This branch will specialize in the design and fabrication of automated systems for the aircraft industry. Automatic systems solutions to material handling problems in other industries will be integrated with the program.

New Bulletin on

B&W KAOWOOL

Gives data on many uses of 2000 F refractory ceramic fiber

B&W Kaowool, the 2000 F refractory fiber, is being successfully used for expansion joints in walls, roofs, around burners and in car tops of ferrous and non-ferrous heating furnaces. B&W Kaowool blankets are also serving as insulation in the pre-heating and stress relieving of large welded units. Write for new bulletin giving helpful data on B&W Kaowool, the multi-purpose ceramic fiber that withstands high temperature service.



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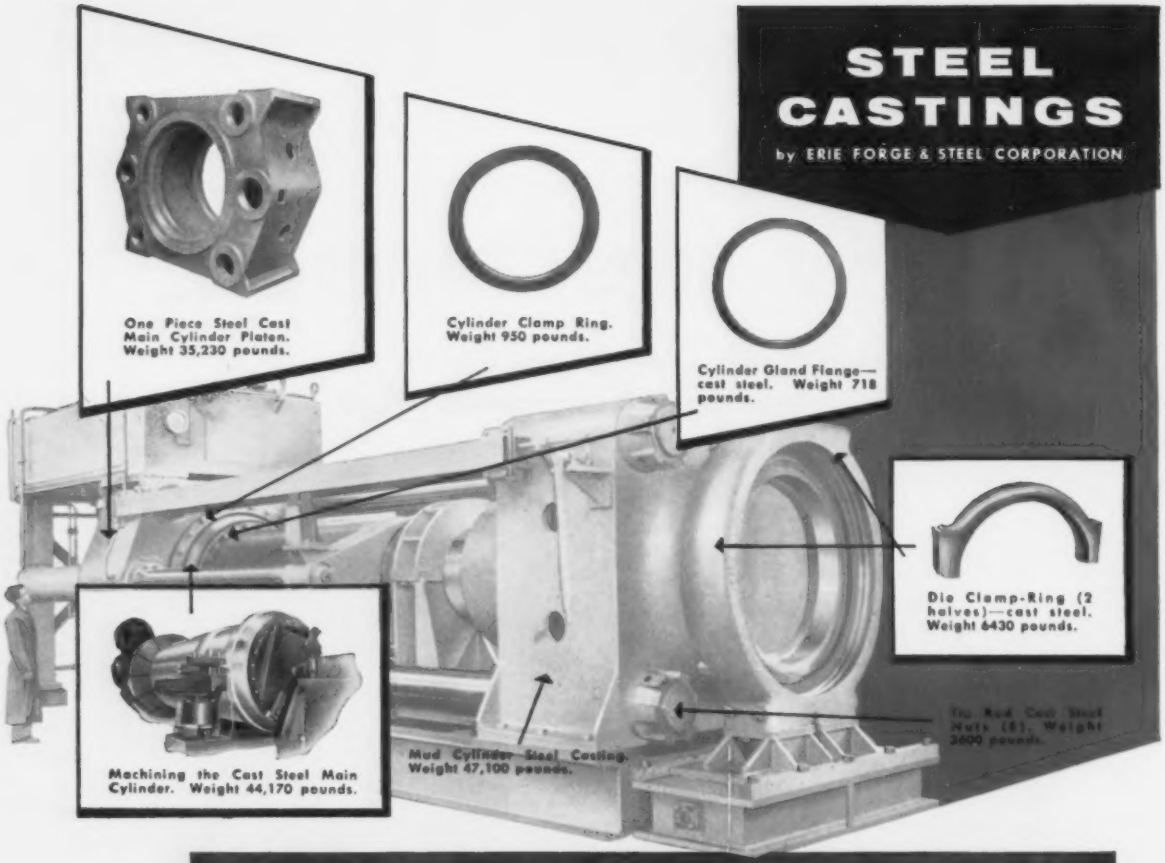
STEEL CASTINGS
by ERIE FORGE & STEEL CORPORATION
One Piece Steel Cast Main Cylinder Platen. Weight 35,230 pounds.
Cylinder Clamp Ring. Weight 950 pounds.
Cylinder Gland Flange—cast steel. Weight 718 pounds.
Die Clamp-Ring (2 halves)—cast steel. Weight 6430 pounds.
Machining the Cast Steel Main Cylinder. Weight 44,170 pounds.
Mud Cylinder Steel Casting. Weight 47,100 pounds.

— for Erie Foundry Company's 2000 Ton Hydraulic Carbon Extrusion Press

Some 73 tons of steel castings by Erie Forge & Steel Corporation provide the rugged, brute strength built into this 2000 ton Hydraulic Carbon Extrusion Press by Erie Foundry Company in Erie, Pa. Steel castings are made from raw materials to finished product within our plants. The responsibility for the quality and dependability of these components in the finished machine rests squarely upon our shoulders.

Many years of experience in making specification steel components, both cast and forged, for Erie Foundry Company's heavy hydraulic presses and forging hammers suggest that we can serve you in a similar satisfactory and profitable manner. Steel castings and forgings are produced completely here "Under One Responsibility and One Control". Every step in their production from beginning to end is directed and closely followed by our metallurgical quality control and engineering supervision. You may expect a call from your nearest Erie Forge & Steel Corporation field engineer in the near future.

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F. G. Fisher, appointed president and general manager, Atkins Saw Div., Borg-Warner Corp., Indianapolis.

William Foster and **R. R. Wertz,** appointed senior general attorneys, U. S. Steel Corp., Pittsburgh.

M. A. Chambers, elected president, National Machine Products Co., Utica, Mich.

C. L. Burgess, elected president, American Machine & Foundry Co., New York.

M. D. Butler, elected president, and Hamburg Tang, elected vice president, Alloys Unlimited Inc., New York.

Dr. B. D. Thomas, elected president, Battelle Memorial Institute.

W. D. Kramer, named general manager, Columbus plant, The Timken Roller Bearing Co.

W. C. Higdon, elected vice president, planning and development, Armco Steel Corp., Middletown, O.

W. F. Munford, becomes executive vice president, engineering and research, U. S. Steel Corp.

F. G. Wehe, Jr., named asst. to the vice president, Overly Mfg. Co., Greensburg, Pa.; **F. C. Petters,** named sales engineer, Architectural Sheet Metal Dept.

W. H. Walter, appointed manager, Market Research Dept., Huppower Div., Hupp Corp., Detroit.

A. R. Teasdale, named director, advanced technology, Temco Aircraft Corp., Dallas, Tex.

L. D. Morton, appointed general superintendent, Wilputte Coke Oven Div., Allied Chemical & Dye Corp.

T. F. Olt, elected vice president, research, Armco Steel Corp., Middletown, O.

J. W. Frederick, appointed superintendent, Polishing Dept., Eastern Stainless Steel Corp., Baltimore; **E. J. Thon, Jr.,** becomes head, Purchasing Dept.

W. B. Carter, appointed general superintendent, Penco Metal Products Div., Alan Wood Steel Co., Conshohocken, Pa.

E. A. Henry, appointed manager, Industrial Sales Dept., Minneapolis-Moline Co., Minneapolis.

H. F. Jacobsmeyer, appointed sales manager, Grayson Controls Div., Robertshaw - Fulton Controls Co.

C. L. Pursell, appointed general sales manager, Sheet Aluminum Corp., Jackson, Mich.

R. C. Cooper, becomes executive vice president, personnel services, U. S. Steel Corp.

J. G. Hamilton, appointed asst. general superintendent, construction, The Rust Engineering Co., Pittsburgh headquarters.

R. C. Gray, named asst. marketing manager, Orr & Senbower, Inc., Reading, Pa.

R. P. Jensen, appointed sales manager, Foil and Container Div., Kaiser Aluminum & Chemical Sales, Inc.; **N. A. Cooke,** named division product manager; **F. X. Curtin,**

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F. C. Jones, F. A. Smith and **W. H. Sims,** named regional sales managers, Foil and Container Div.

Sidney Wade, appointed manager, distributor products, Linde Co. Div. of Union Carbide Corp.

H. H. Deem, appointed director, manufacturing, Valvair Corp. and Sinclair-Collins Valve Co.

W. J. Young, Jr., named asst. sales manager, steel equipment products, Berger Div., Republic Steel Corp., Canton, O., headquarters.

Michael Zetz, appointed superintendent, quality and production control, stainless sheet and strip mill, Jones & Laughlin Steel Corp., Louisville, O.

C. M. Beach, appointed general manager, The Heald Machine Co., subsidiary of The Cincinnati Milling Machine Co.

F. G. Saviers, appointed asst. to the controller, Westinghouse Electric Corp., Pittsburgh.

W. H. Perry, becomes president, Cardinal Scale Mfg. Co., Webb City, Mo.

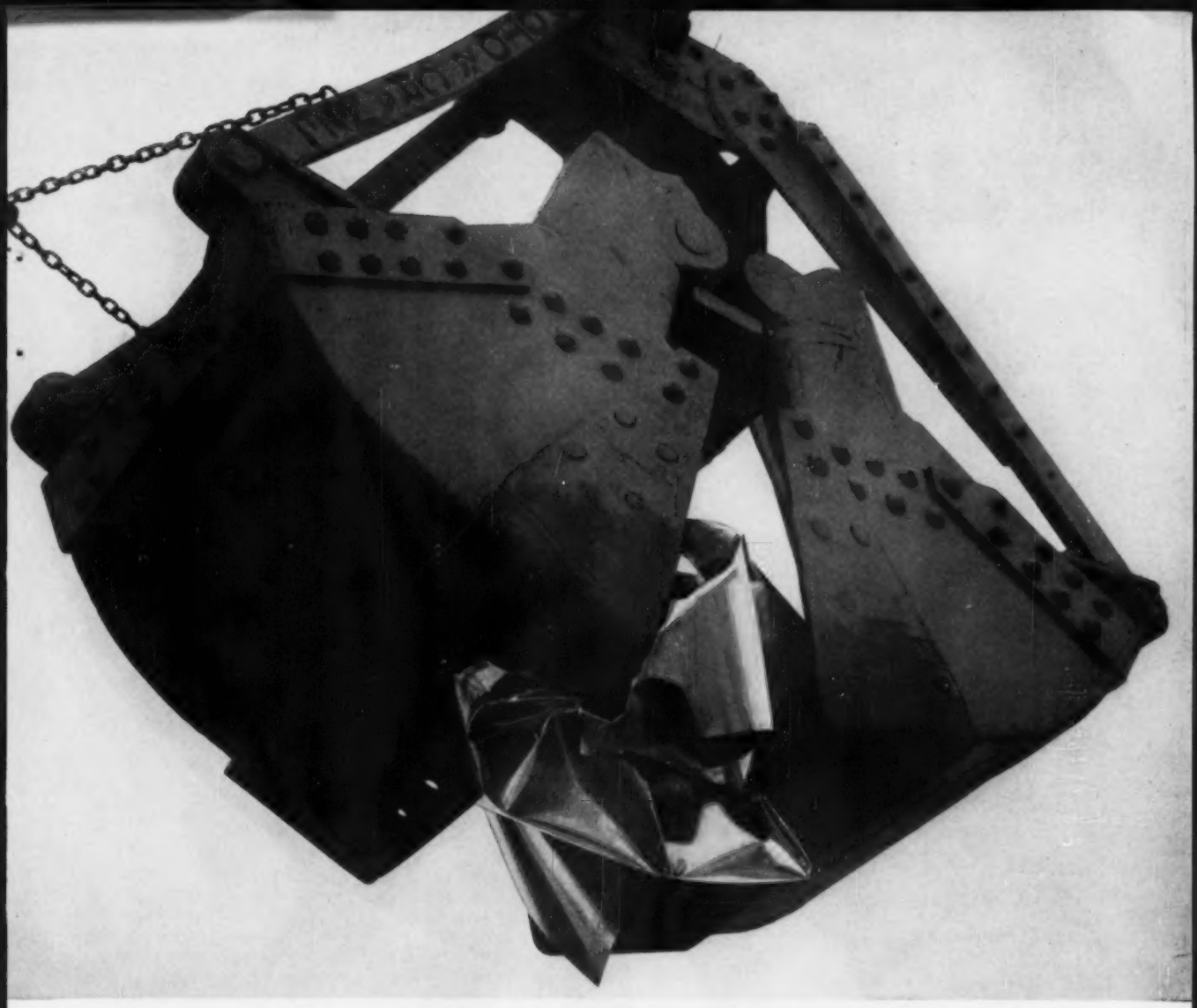
T. R. Lally, appointed manager, Eastern sales district, Pittburgh office, Basic, Inc., Cleveland; **G. W. Edwards,** appointed manager, Detroit, Buffalo-Hamilton and Sharon-Youngstown-Warren areas.

Dean Daniels, becomes Western district sales manager, Silicone Products Dept., General Electric Co., Downey, Calif.

R. C. Bevis, appointed sales manager, The Cincinnati Milling Machine Co.

J. E. Holt, appointed asst. division superintendent, Flat Rolled Products Div., Midland Works, Crucible Steel Co. of America; **N. G. Bell,** named superintendent, 24-in. bar mill.

R. A. Kokat, appointed branch manager, Philadelphia operations, and **G. R. Garinger,** appointed asst.



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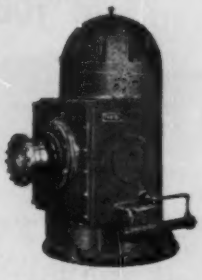
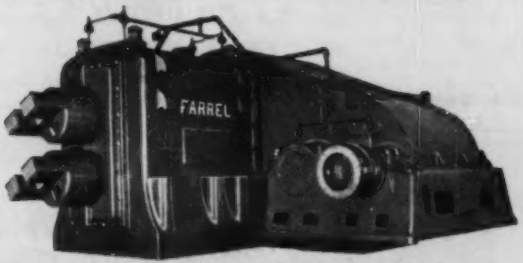
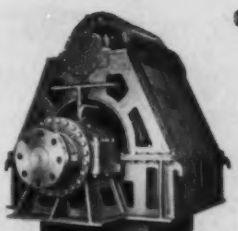


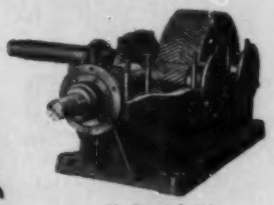
Vertical right-angle drive.



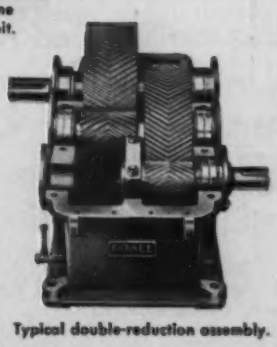
Combination rolling-mill drive and pinion stand.



Vertical marine propulsion unit.



Horizontal right-angle unit.



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branch manager, Toledo, O., mill branch warehouse, The Carpenter Steel Co., Reading, Pa.

J. J. Murray, appointed national accounts sales manager, Yale Materials Handling Div., The Yale & Towne Mfg. Co.; **N. J. Kemp,** appointed Detroit sales and service branch manager; **James Rainey,** promoted to Midwest regional sales manager.

L. H. Cousineau, appointed vice president, The Cincinnati Milling Machine Co.

F. H. Hurless, appointed sales manager, Anaconda Sales Co., New York.

R. F. Schultz, promoted to chief accountant, Waukegan, Ill., Works, American Steel & Wire Div., U. S. Steel Corp.; **H. W. Williams,** named chief accountant, Cuyahoga Works, Cleveland.

F. A. Klemach, appointed senior staff engineer, missile applications, Vickers Inc.

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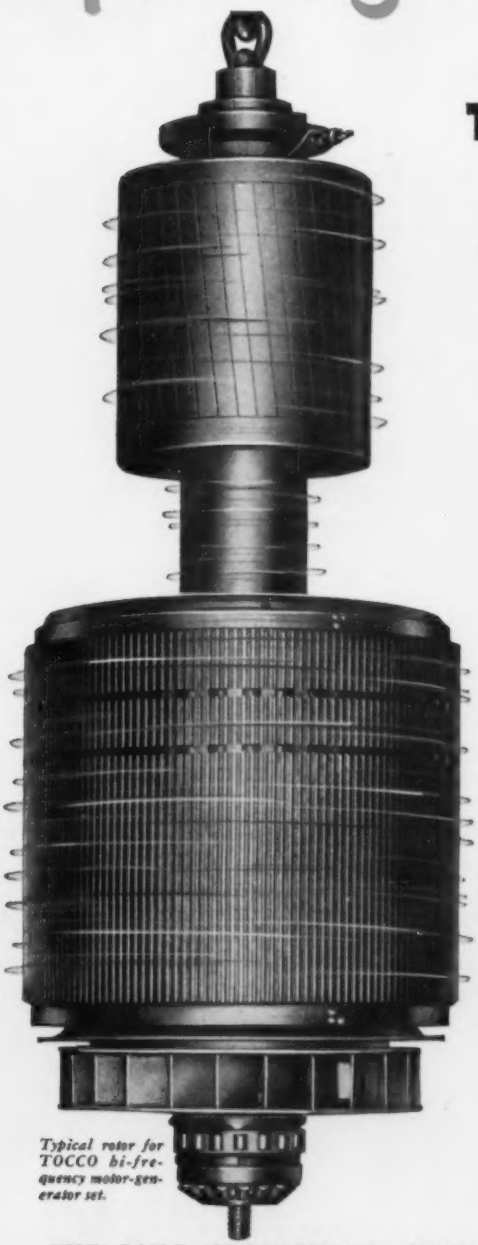

Typical rotor for TOCCO hi-frequency motor-generator set.

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Advantages of TOCCO Vertical MG Sets

The large TOCCO vertical type motor generator set has numerous advantages over conventional horizontal type sets. Vertical construction permits the use of very large bearings and also minimizes the hazard of major damage to the set in the unlikely event of a bearing failure. Longer bearing life is achieved due to lower pressure and uniform loading of the bearings. Maintenance is greatly simplified because the rotor can be removed vertically with a simple hoist. Anti-vibration mountings between the base and the MG rotor-stator assembly practically eliminate vibration. No special foundations are needed. Lastly, TOCCO's vertical design cuts necessary floor space to less than one-half the area required by horizontal motor-generator sets.

TOCCO vertical MG sets are available in sizes up to 350 KW and frequencies from 1000 to 10,000 c.p.s.

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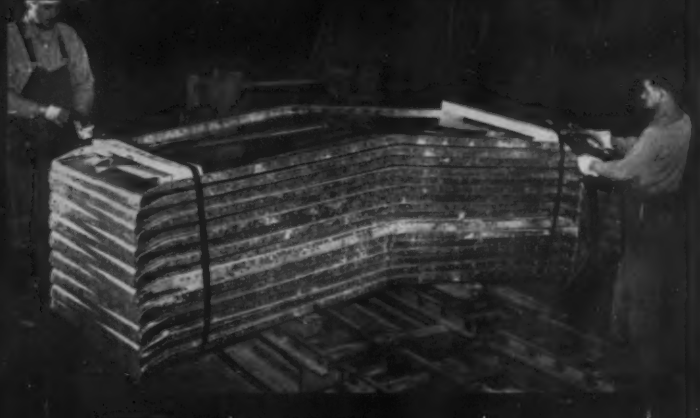
ACME STEEL **STEEL STRAPPING** unitizes aluminum ingots for better handling and storage. *(Idea No. U6-16)*



ACME STEEL **STEEL STRAPPING** unitizes steel stampings for easier handling and shipping. *(Idea No. U6-20)*

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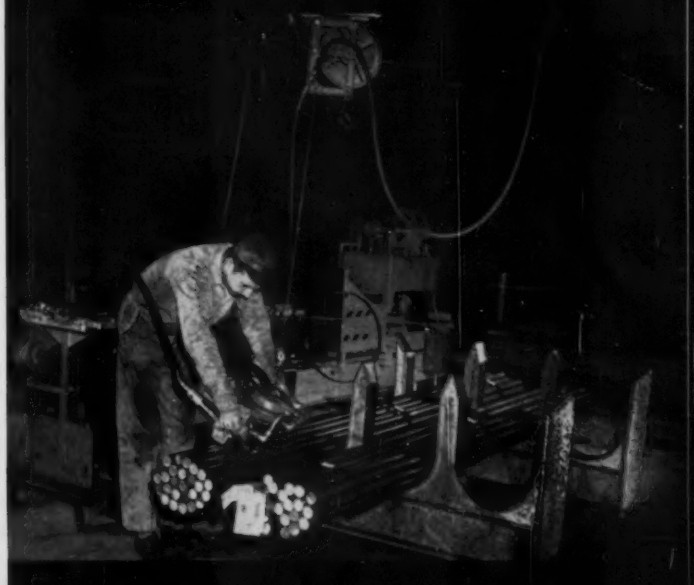
ACME STEEL **STEEL STRAPPING** palletizes heavy wheel and brake assemblies for fast, mechanical handling. *(Idea No. U6-19)*



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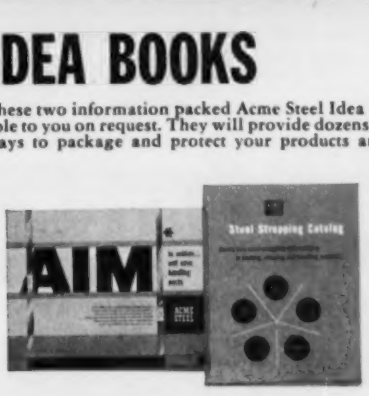

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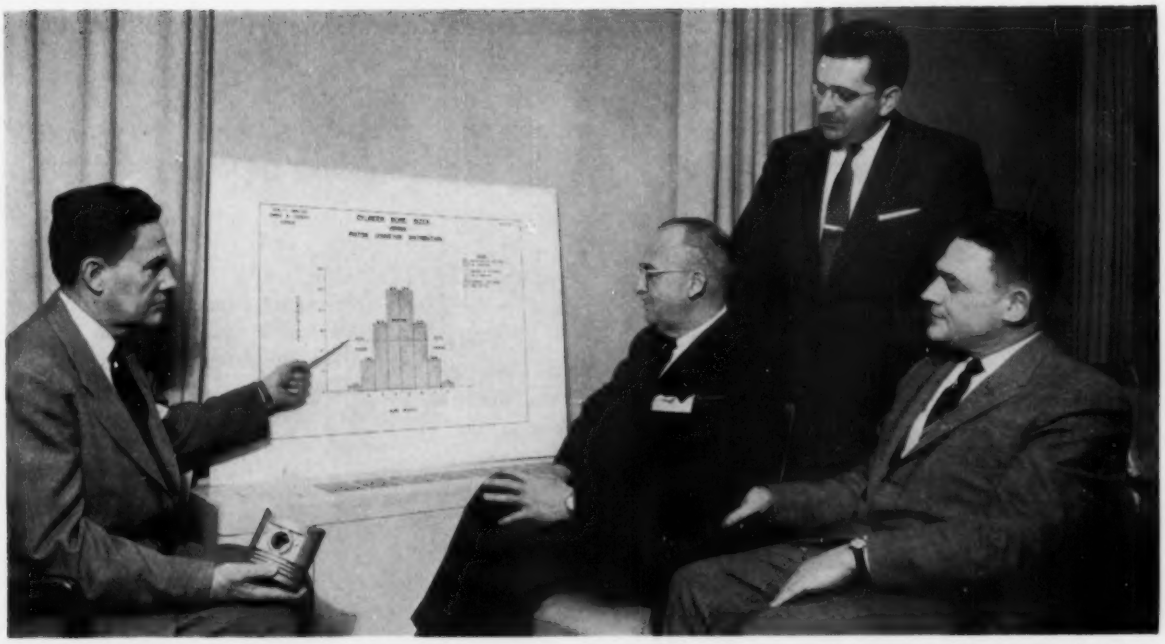


QUALITY TEAM: The author (left) explains statistical relationship between machine capability and control of piston inventory to Ford Engine Division's Ray Morrissey, manager of manufacturing engineering, P. H. Ponta (standing), general manager, and R. A. Boyle, manager of quality control.

How to Set Up Sensible Tolerances

Two and two don't always add up to four. Quality control men are proving it, and showing that many of today's tolerances are completely unrealistic.

They've taken a common-sense approach to the plus-or-minus problem and come up with some simple formulas that help cut down on production woes.

By I. A. De Grote—
Supervisor of Quality Analysis, Engine Div., Ford Motor Co., Dearborn

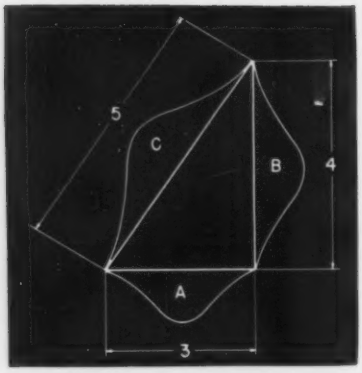
▪ Too often engineers are inclined to blame production and assembly problems on manufacturing. And the usual result is a decision to tighten tolerances a bit more next time.

A better way is to design within machine capabilities. This involves knowing what machines can do, and the use of some statistical techniques. Fortunately, the mathematics needed has now been boiled down to little more than simple arithmetic.

It's one of the fundamentals of quality control and a law of nature as well that nearly everything, when measured for a particular trait, will form what we call a normal distribution. This is the familiar bell-shaped curve resulting from repeated tosses of a coin, throwing dice, or measuring weights or heights of a large number of people.

Use the Odds—Since the laws of probabilities also hold for machines, production processes and assembly fits, they are the best basis for setting tolerances. Otherwise, you're bucking the percentages.

First, consider tolerances in relation to needs of the product. Quality control people don't try to tell the engineer what clearance



MATING TWO PARTS: True assembly tolerances for mating two parts are determined with the same formula for finding hypotenuse of right triangle. This is based on normal distribution shown for A, B, C.

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is needed between a shaft and a hole—engineering experience will dictate that. What statistics do provide is a simple way to tell what clearance to expect with certain dimensions and tolerances; or, with given assembly clearances, what individual part tolerances should be to get this clearance.

Before we knew about the statistical approach to assembly tolerances, we would take the smallest diameter shaft and subtract it from the largest hole, and vice versa, to find out what clearances to expect. Most engineers still do this, but it doesn't quite work out in actual practice.

Familiar Formula—The assembly tolerance of two parts actually follows the simple formula used for finding the hypotenuse of a right triangle; that is, the overall tolerance on an assembly is equal to the square root of the sum of the squares of each component tolerance.

If the variation of one part is three and the other part four, then the variation of the assembly will be five instead of the seven that's been used all these years. Reliability of the system depends, of course, on making parts under statistical quality control and selecting them at random for assembly.

Graph Saves Figuring—To make it as easy as possible, we use the accompanying nomograph when we have only two parts. The line on the left is the tolerance of the male part, such as a valve stem diameter. The line on the right is the tolerance of the female part, or the valve guide hole diameter.

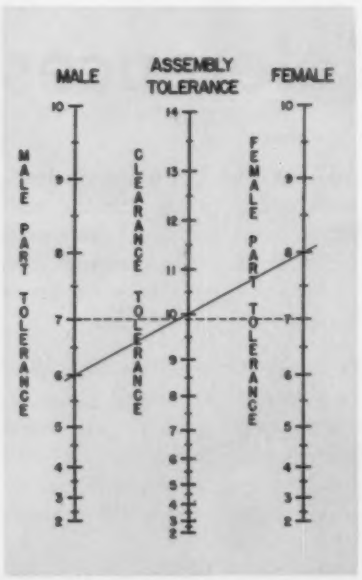
The broken line across the center shows that a 0.0007 in. tolerance on each gives an assembly tolerance (shown on the center line) slightly under 0.001 in. The solid diagonal line shows that about the same assembly tolerance results from 0.0006 and 0.0008 in.

Here's a hypothetical example of more than two parts—let's say four parts with total tolerances of 0.002, 0.003, 0.004 and 0.005 in., adding up to 0.014 in. They might represent connecting rod center distance, crank throw, pin hole to dome dimension on the piston, and crank bore to engine block bank dimension.

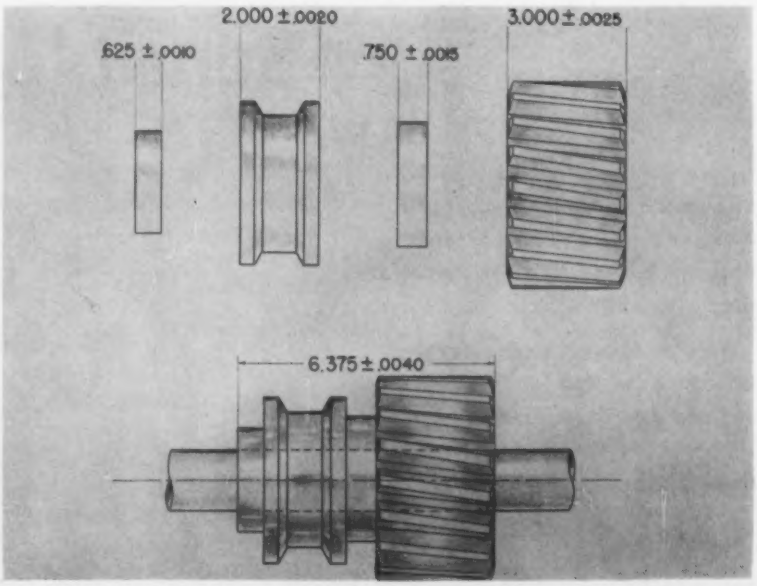
The total tolerance desired would be for the dimension from the bank to the top of the piston at top dead center. We want to know the stack-up or assembly tolerance.

Same Method Applies — The formula is the same as for two parts— the square root of the sum of squares—so assembly tolerances or T_A=0.00734 (±0.00367 in.) instead of the 0.014 in. obtained by addition. This would probably be rounded off to ±0.004 in.

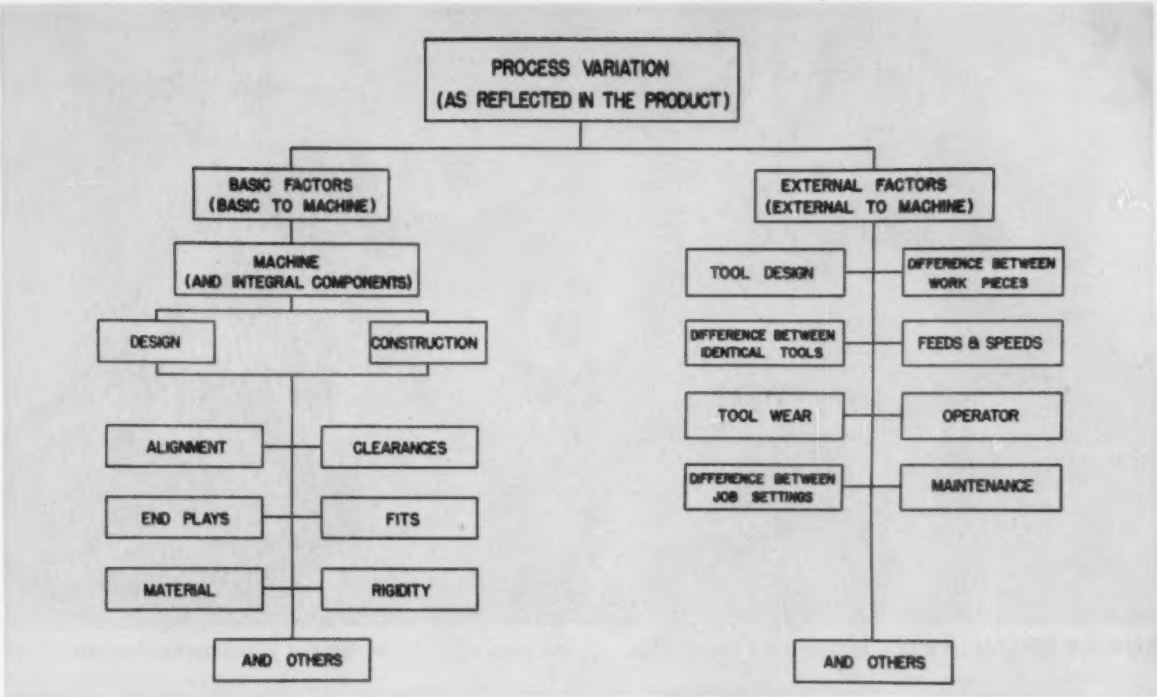
If an assembly is to be inserted



QUICK ANSWER: Nomograph provides rapid method of finding two-part assembly tolerance.



MORE PARTS: Assembly of four typical parts by statistical tolerances gives a total variation of ±0.00367 (0.004) instead of the usual ±0.0070 in. obtained by straight addition.



MACHINE CAPABILITY: It's responsible for only part of the total process variation. Factors depending on machine are shown at left; those which stem from various other influences are listed on the right.

into an opening of some kind, clearances can be determined in the same way. Suppose nine parts are going together and you can allow only 0.008 or ±0.004 in. on the assembly. It would at first seem that the tolerance must be less than 0.001 in. on each, since all the maximum parts would give +0.0045 in. and all the minimum parts would make an assembly −0.0045 in. from the mean.

Using the proven formula, all parts could have a tolerance of 0.002 in. and still meet the required tolerance (±0.004) of the assembly. In fact, 0.002 in. on each part would make the total tolerance only 0.006, or ±0.003 in. This statistical assembly tolerance is good even though total spread between all minimum or all maximum parts could be 0.018 in.

With these techniques, it isn't necessary to take chances on certain tolerances. You can predict quite accurately what to expect and how much variation can be allowed and still satisfy product needs.

Know Your Machines — The goal should be to establish the most economical tolerances that will give the required precision and yet take full advantage of the many factors which affect manufacturing variation. To do this, we must know the capability of the machine or process in addition to the needs of the product.

Capability is the ability to produce parts within satisfactory limits. This includes size, taper, out-of-roundness, runout, off-squareness, flatness, microfinish, or any other quality that can be measured.

For several years, Ford has been making machine capability tests. These tests have helped set up realistic tolerances that make product requirements and process capability more compatible.

Consider the Whole—The machine is only one of many sources of variation in a production process. For this reason, it can't be allowed to consume all the specified tolerance if the total process is to have any chance of meeting specifications.

A capable machine tool is expected to show basic variation somewhat less than specified tolerance. Machine processes differ greatly in nature and a flat, across-the-board standard allowance isn't possible.

Ford's experience has shown that jobs successful from the quality standpoint are generally those in which basic machine variation consumes no more than three-fourths of specified tolerance.

Statistical methods are no substitute for engineering. We are not proposing that quality control take over the job of setting tolerances nor are we suggesting that all engineers become statisticians. At Ford, we have worked jointly.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., The IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

BIGGER FRAME: Vibraslide unit has a standard barrel, but uses a big frame for the vibrating mechanism.

High-Frequency Vibrations Slash Barrel Finishing Time

GETS INSIDE: Inspection of a complex part shows that the interior and the exterior are finished simultaneously in the new machine.

Some parts take a long time to barrel finish. Others seem to defy the process altogether.

But here's a new type of barrel finishing machine that challenges the toughest jobs.

It combines vibration with rotation to do the "impossible" with ease and speed.

■ Superior barrel finishes in one-fifth to one-half the usual time; double and triple the normal workpiece loads in the same barrel space; no need to rack large or delicate parts; successful tumbling of "impossible" pieces—these are the chief claims for a new barrel finishing machine that combines horizontal rotation with 2300 endwise vibrations every minute.

Aptly enough, the machine is

called the Vibraslide. Made by the B. W. Elliott Mfg. Co., Inc., Binghamton, N. Y., it was recently demonstrated for the first time at the Newark, N. J., plant of Metal Finish, Inc.

Metal Finish officials say they've had outstanding success with the two Vibraslide barrels they installed. For example, truss rings, which formerly took 40 hours to process in a standard barrel, now get a comparable finish in just two hours. And jet blades, another 40-hour item with ordinary barrel techniques, need only a 16-hour cycle when they're jiggled and rotated at the same time.

Just Like Magic—Observers at the initial showing saw the effects of uniform, high-speed vibration demonstrated in a unique way. A delicate piece of glass stemware was placed on top of a quantity of finishing media in a barrel which was vibrating, but not rotating. The glass was gradually drawn down and through the media until it disappeared. About a minute later it reappeared, undamaged, at the top of the media layer.

The Vibraslide machine uses a standard octagonal barrel. But its 60 in. by 50 in. by 8 ft. frame is larger than that used for conventional barrel machines. This is to accommodate the vibrating mechanism; two eccentric type vibrator units (one at each end of the barrel) and the motor that drives them in synchronization. A separate motor rotates the barrel.

Rotational speed, either with or without the vibrating action, can be varied from 4 to 20 rpm in either direction. Slow rotation insures proper mixing of work, media, finishing compound and water.

Vibrator Works Alone—All jobs do not require barrel rotation, however. The vibrating action alone will rotate both media and workpieces to some extent, and this technique is often used with 85 pct loads of long or delicate parts. Loads of this size are about double those processed in conventional finishing barrels.

The speed of the new system is a result of opposing forces within the barrel once the vibratory mechanism is in motion. "A double motion is actually set up," says P. E. Kirchartz, of Metal Finish, who was a consultant in the development of the new barrel. "When the movement of the vibratory cycle opposes the movement of the rotating barrel, a resistance builds up within the sliding mass. This increases grinding and cutting action," he explains.

Kirchartz notes that without the vibrating motion, the barrel is just a standard finishing device. But when the barrel oscillates, it becomes particularly effective as a "cutdown" tool.

Replaces Hand Methods—"This system opens a new vista for the barrel finishing of parts which, because of design, previously had to be finished in slower, less economical ways," Kirchartz observes.

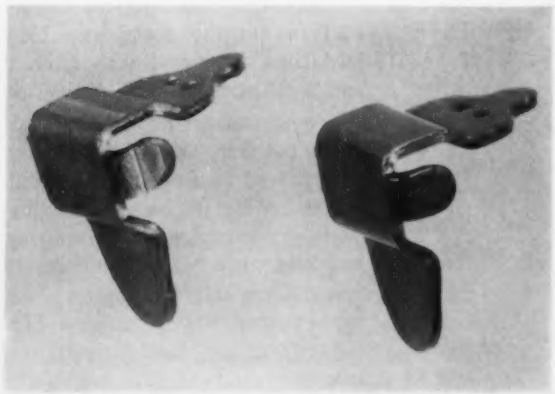
As an example, he cites a magnet armature used by a business machine manufacturer. It has small radii, many of which are so well blocked off by other portions of the part that barrel finishing efforts with previous methods are ineffective; each part was done by hand.

Now, instead of hand finishing, up to 2000 of these parts can be handled in the vibrating unit every 1½ hours. Results are more uniform than ever before.

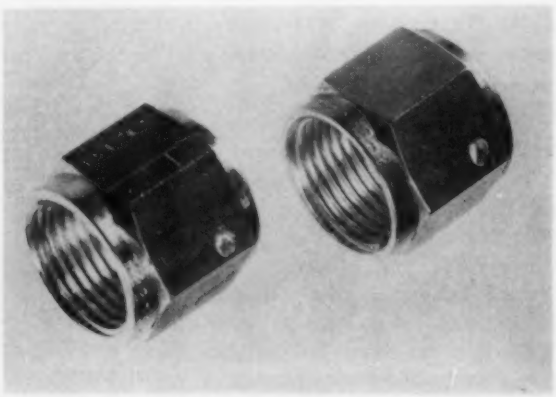
Don't Need Fixtures — Demonstrators point out that stock removal rates are very rapid even when the vibrating barrel rotates at only four rpm. This makes it feasible to process delicate or large parts without the fixturing that is ordinarily needed to protect them from nicks or breakage.

Load levels used with standard barrels are effective with the new machines, experts say. But they add that it may be economical to reduce the amounts of media and compound once a new machine is installed and several parts have been run.

Floor space savings can also be important with Vibraslide installations, it's said. This assumes that one of the vibrating units could do the work of up to four conventional barrel finishing machines.



"IMPOSSIBLE" WORK: Business machine parts, formerly hand finished, are now deburred in 2000-piece lots in just 1½ hours.



DOUBLE TROUBLE: Burred edge of small hole and the threaded ID, formerly problem areas, are finished easily in a vibrating barrel.

CAREFUL DEBURRING: Women use dental tools and 30-power microscopes to remove burrs, dirt, and other irregularities from gyro parts.

By R. H. Eshelman—Engineering Editor

Automotive Skills Whip Missile

Management, manpower and machines — the same old elements with a facelift—are the keys to success in the missile field.

Everything you make must be a little more precise, everything you handle takes a bit more care.

That's why AC Spark Plug's plant for making inertial guidance systems is considered a model of its kind.

▪ What's needed to get ahead in missile work? The experience of General Motors Corp.'s AC Spark Plug Div. offers a clue. AC's Electronics Div. in Milwaukee has learned how to handle tolerances in millionths of an inch. Further, it has hung up an enviable production record while cutting the cost of one of the most complex—and important—pieces of hardware used in ballistic missiles.

We're speaking of the inertial guidance system. Basically it's an automatic pilot. A computer provides the "brains," and sensitive gyroscopes control yaw, pitch and roll on long range missile flights. The gyro elements are contained in a cylindrical gimbal about three feet in diameter. Associated computer elements comprise another package about the same size. The cost of each guidance-system assembly is estimated at about a quarter the total price of a missile.

Why Precision? — There's good reason for precision in these missile items. Martin J. Caserio, manager of AC's Milwaukee operations, says, "Parts in our inertial guidance system are machined to tolerances measured in millionths . . . because direction and distance to a target are measured in degrees of arc on the earth's surface. Variations of millionths of an inch in the gyroscopes could cause us to miss our target completely at the distance a ballistic missile would normally fly."

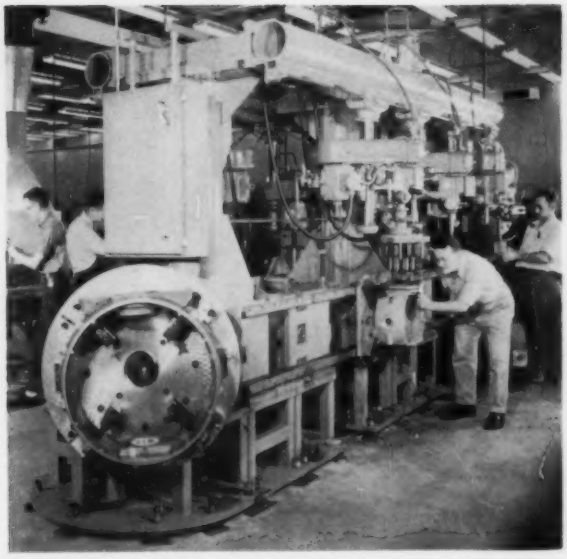
The firm has done its job well. Its guidance unit, the Achiever, has had no failures in ballistic missile launchings to date.

Technical Management—In the research and development stage AC had one big advantage. It could and did draw on G.M.'s Tech Center facilities to the fullest. But just as important, management organized to cut the notoriously long lead time associated with aircraft and missile development work.

Works manager Roy McCullough points out that, "Manufacturing has been moved up from its traditional position of last in line so that it can begin to work on manufacturing problems while research and development are still in progress. We have pushed the production line right up to the back door of the laboratory."

AC's an old hand at this sort of thing. It's used this approach on other military projects such as pro-

CLOSE WORK: Special tooling and gaging enable women turret lathe operators to produce gyro parts within 25 millionths.



TRANSFER TOOLING: Special eight-station machine replaces nine standard drill presses for drilling and tapping gimbals.

Hardware Job

duction of electronic gunsights, navigational and bombing computers, engine and fire control equipment.

Use Engineers—One sign of this speed-up philosophy is that many of the firm's production supervisors are young graduate engineers. The reason: They don't have fixed ideas of how things can't be done. And their fresh, unconventional approach in this field can lead to big gains.

For example, despite the word that anodizing would ruin aluminum gears, they went ahead and tried it as a way to boost wear resistance. It worked. So has lubrication—also supposedly bad for white metal gear trains.

These engineers on the production floor play still another role: they help modify product design in prototype stages. This tends to eliminate production engineering as a separate department. As a result, jobs get done faster and better.

For instance, take telemetering units, which read out guidance system performance data during missile test firings. One of the original designs was reworked on the production floor and made into a plug-in item with printed circuits. Design engineering approved the idea and the change was made. Now the same production engineers plan to transistorize these units for even greater compactness.

No Shortage—AC's management reports no particular problem in getting an adequate supply of technical manpower. One reason may be that many of the more exacting but tedious jobs are filled by women.

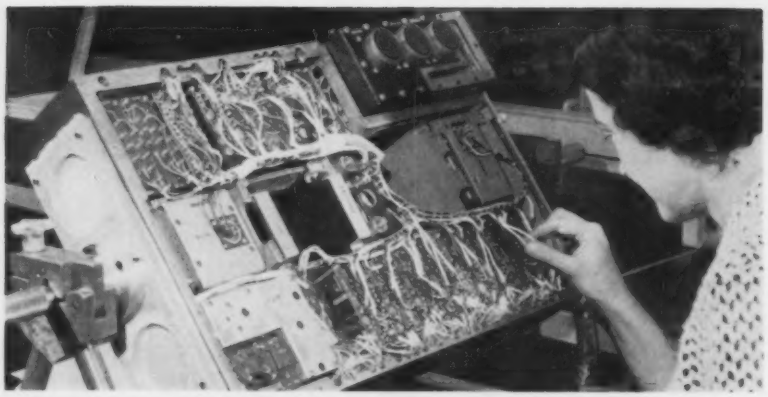
Skilled male machinists and tool experts act as supervisors. They set up machines and run off trial parts. Then women operators take over. They handle everything from automatic screw machines to precision boring and grinding equipment.

Women also do such meticulous jobs as removing burrs and polishing tiny parts under 30-power microscopes. Many of the tools they use are similar to fine dental equipment. These finishing processes often take as much time as all the prior machining. Most of the assembly work on gyro parts and electronic circuits is done by women, also.

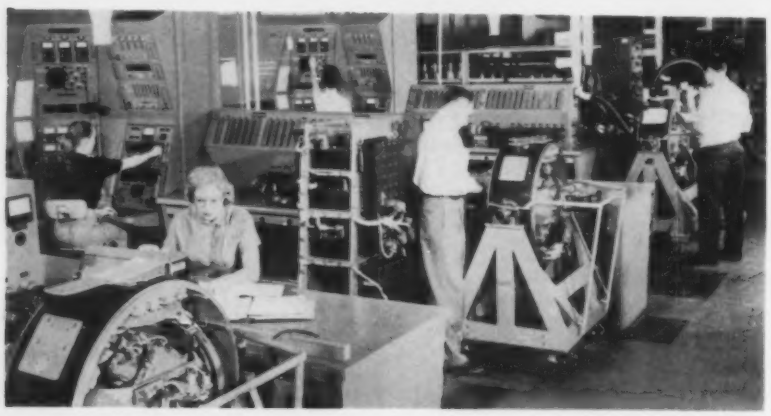
Highly Trained—Actually these women are highly trained technicians. They're carefully selected and then given six weeks of intensive training in the specific job skills they'll need. For this type of minute, detailed work the greater natural patience and manual dexterity of women has proved out; they make up well over 50 pct of the producion force.

The level of technical competence runs high throughout the organization. About 1400 of the 5500 employees are engineers. Yet the laboratory precision achieved in production isn't entirely dependent on human skills. Wherever possible it's built into tools, machines and inspection equipment.

Machines Rebuilt — Machines bought for the plant are the usual types built for precision production. Yet in many cases AC tears them



PLENTY OF PATIENCE: Women workers prove adept at painstaking jobs, such as wiring power supply units for guidance systems.



FINAL TEST: Electronic test stands simulate actual flight conditions in final checkout for Achiever inertial guidance systems.

down and rebuilds them so they'll produce parts within tolerance limits as narrow as 25 millionths of an inch.

Temperature and humidity control helps the never-ending drive for utmost precision, too. Entire production areas, such as the one devoted to gimbal machining, are air conditioned. Cutting heads on whole batteries of machines are held within two degrees of a prescribed temperature. And two to three hours of machine warm-up is standard practice for close-tolerance boring, turning, grinding and lapping. On certain jobs machines are never shut down until the entire lot of parts is run off.

Tooling Helps—Tooling is another important factor in attaining extreme accuracy in these missile guidance systems. By providing unusually complete tooling for machine work, AC's master mechanic's department takes the question of human skill—or the lack of it—right out of many critical operations. This often makes it possible for women operators to turn out parts as precisely as skilled machinists could do.

In electronic equipment assembly, breadboard techniques simplify the job. Wires are precut, coded and stored in marked trays at the point of assembly to speed the work.

Rigid Inspection—Advanced inspection methods also help to control quality. The plant uses a lot of in-process gaging, especially in precision machining. Where this type of automatic control can't be used, operators check critical dimensions of parts with the latest type electronic and air-gages.

Statistical quality control based on sampling inspection is used in some areas, where practical. Then, too, the inspection department uses optical comparators extensively, both for sample parts and for tools and gages.

Finished gyro assemblies are checked out on aircraft type collimators. The system is pre-set so that inspection can be done in minimum time. In addition, each completed unit gets a thorough "flight test" on the floor by means of an electronic simulator. The equipment used to measure gyro characteristics is similar to an electrocardiograph machine.

Purchased electronic components for the gyro system get 100 pct inspection when they're delivered. Since about 50 pct of all guidance system parts are bought outside, quality workmanship by vendors is especially vital. To assure close cooperation, AC chooses many of its suppliers within a radius of a few hundred miles from Milwaukee.

Common Materials—Surprisingly, no exotic materials are needed in the firm's guidance systems. AC depends on the usual aircraft quality materials: high strength aluminum alloys, stainless steels, titanium, bronze, and magnesium.

Most of the techniques used for maintaining clinical cleanliness, humidity and temperature control, and stabilized workpieces, machines, tools, and gages are well known. It's the efficient combination of management, manpower and machines tailored to the job at hand that's unusual.

Still, the company strives for even greater efficiency. As GM Vice President S. E. Skinner emphasizes: "We expect to continue our research and development in order to improve our products. This science of guidance is still an infant, and we will keep on exploring better and cheaper ways to do the job."

EASY MOUNTING: Alnico magnets hold a variety of sizes without any change in fixturing.

Magnets Solve Painting Problem

A permanent magnet holds without adjustments, latches, or release mechanisms.

Such a simple device turned out to be the answer where no mechanical units could be relied on to give troublefree service.

▪ Setting up an efficient painting line for Carboloy mining tools posed a materials handling problem. With several sizes and shapes in production and mixed shipments regularly required, no mechanical fixture for carrying tools through the cycle proved sufficiently simple or trouble-free.

This was the problem at the Metallurgical Products Dept., General Electric Co., Detroit. The answer came in the form of General Electric Alnico V magnets.

More than 400 1-oz horseshoe magnets were hung from wire loops on suspended conveyor channels. The magnets swivel and permit tools to hang vertically even though the line has to dip and climb. The magnets hang with like poles next to each other to avoid mutual attraction.

Here's the Cycle—After inspection, the unpainted tools are attached to the magnets by hand. As the line moves, it dips to submerge parts in an aluminum lacquer bath.

As the tools emerge, a blast of compressed air knocks off built-up paint at the nose and the upper end near the magnet. Air circulated around the tools speeds drying.

At the end of the cycle, the tools are removed by hand, inspected, and packaged for shipment. Meanwhile, the conveyor line passes the magnets through a hot alkaline cleaning solution to remove paint.

DIPPING CYCLE: Tools enter bath of aluminum lacquer. Mechanical agitation keeps lacquer stirred.

WATCHFUL MONITOR: Relieved of manual control, operator can oversee automatic cycle to insure quality.

Punch Cards Program Rolling Mill

Manual control of a rolling mill calls for great experience, judgment, and alertness.

Card programming hasn't eliminated the need for these qualities.

But by relieving the operator of tedious adjusting, it gives him a chance to reach the ultimate in quality and output.

▪ At the press of a single button, a reversing roughing mill now goes through a complete rolling sequence. A new card programming system controls the steps for each given slab.

It's all part of a 44-in. hot strip rolling mill just placed in production at the Aliquippa Works, Jones & Laughlin Steel Corp., Aliquippa, Pa. The mill will be able to roll over 100,000 tons of coiled strip per month.

The secret of the mill's efficiency lies in the control system, called Prodac (programmed digital automatic control), designed and built by Westinghouse. IBM punch cards are being set up to cover nearly every slab and strip size for each grade of steel.

Multiple Control—A single card contains all information required for a given schedule in digital form. This includes control of: mill screwdown opening, from 0 to 14 in. in 1/32-in. increments; edger adjustment opening, from 6 to 44 in. in 1/16-in. increments; mill speed, at 115, 300, 440, 715, 880, or 1100 fpm; and edger speed.

Edger speed is matched to mill speed, but is from 0 to 60 pct slower in eight 7.5-pct steps to take care of draft in the horizontal mill. A notation on each card indicates the last pass.

To make mill operation automatic, detectors located on each side of the mill respond to strip radiation. Each of these detectors, about 15 ft from the center line of the mill, starts the slowdown when the tail end of the strip passes.

Fast Resetting—A load detector on the mill detects the instant the strip leaves the mill for fast repositioning of the rolls and re-entering for the next pass. Tests during initial operation show that slabs are kicked out only far enough to clear descaling sprays.

In operating manually controlled reversing mills, the operator must

control mill speed, mill direction, and roll positioning. Further, for each schedule, he must control the various tables associated with the mill, guides for aligning the material, and water sprays. If there's an edger, he must also control the setting of the edger rolls.

It's here that human error is possible, with consequent losses in production or product quality. The card system permits precise scheduling of all these factors to benefit both mill output and product quality.

Cards in Sequence—With a stack of cards inserted in the IBM card reader, the mill operator begins the first schedule by pressing a "schedule advance" button. The card reader reads the first card and stores the information.

When the operator pushes a "pass advance" button, information applying to the first pass sets the separation and speeds of horizontal and vertical rolls. The slab then enters the edger and mill.

When the tail end has passed beyond the hot metal detector, the mill decelerates to limit the travel of the slab after it clears the rolls. As soon as the slab clears the rolls, the load detector stops the mill.

At the same time information for the next pass is used to reset the edger and main roll separators and to establish speeds and direction of rotation. The mill then accelerates and the slab enters for the second pass. Thus the mill can proceed through an entire cycle of up to nine passes once the operator initiates the first step. However, if unusual conditions require, the operator can operate the mill manually at any stage.

Button for Each Slab—In the case of a sequence of identical processing, the operator need only press the pass advance button for each slab. If the second schedule is different, then pressing the schedule advance button will cause information from the next card to be extracted. The new schedule proceeds when the pass advance button is again pressed.

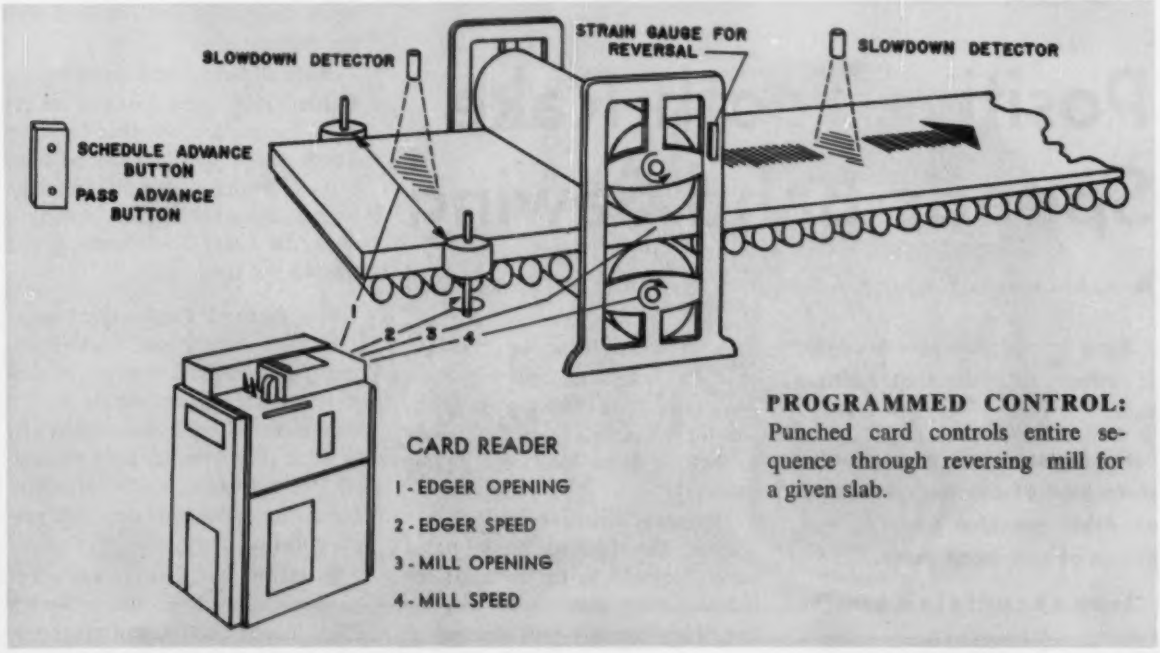
Descaling sprays turn on automatically whenever steel is in the scale breaker. Time delay relays, adjustable between 0 to 3 seconds, delay the turning on and off to compensate for the distance between the scale breaking edger and the sprays. The sprays on the delivery side of the mill are turned on automatically on all even passes and stay on as long as steel is in the mill.

With the operator relieved of responsibilities of manual control he can monitor the operation and operate associated auxiliaries. Possibility of errors is further reduced by the digital checking information contained in each card.

Trace Action — The IBM card reader transfers data applying to screw-down from punched card into storage. An analog signal representing actual roll separation is transmitted from the mill to an analog-to-digital converter for conversion to digital form.

When the operator presses the pass advance button, the stored roll-separation data is extracted and supplied to the digital difference detector. Here a subtraction yields a signal representing the difference between actual and desired roll separation. The digital-to-analog converter then yields an analog signal for input to an amplifier.

With the output of this amplifier supplied to a regulator, a variable voltage drive adjusts the screws until roll separation is equal to that specified by the punched card. Similar processes control mill speed, edger speed, and edger opening.



PROGRAMMED CONTROL: Punched card controls entire sequence through reversing mill for a given slab.

LEFT: High-speed steel Claw Tooth band cuts 9½-in. diam Rycut-50 bar at 15 minutes per cut.

Positive Tooth Rake Speeds Band Sawing

By R. Anderson—Engineer, Saw Band Div., The DoAll Co., Des Plaines, Ill.

Each tooth of a saw blade is in effect an individual cutting tool.

It's logical, then, to adapt the same kind of cutting edge used on other machine tools to the design of saw band teeth.

Some surprising benefits result.

▪ A forward hook or "positive rake" on saw-band teeth will boost band machining efficiency. It generates the same chip shape that works so well on lathe tools and milling cutters.

Two main benefits result:

First, the hooked teeth get a better foothold in the material for faster cutting rates with less effort. They literally pull themselves through the work. Reduced feeding pressure cuts fatigue in manual feeding, and makes for smoother operation on machine-fed work.

Secondly, the positive rake teeth have been found to last longer.

Taking a cue from nature, The DoALL Co., Des Plaines, Ill., designates this tooth style "Claw Tooth." Its forward-slanting tooth face evolves into a long, somewhat elliptical gullet for best distribution of stresses.

Compare Test Runs — Research at DoALL's cutting laboratory points out the difference in feeding force and cutting rate between Claw Tooth and other saw bands of like size and pitch. The test material was a bar of SAE 1018 steel.

A ball bearing cut-off bar provided control of feeding force through a weighted container. With the test piece in front of the cut-off bar, a ½-in. 4-pitch Buttress saw at 150 fpm completed several cuts with the cutting rate recorded. Next, at the same saw velocity, a ½-in. 4-pitch Claw Tooth made several cuts, but at reduced feeding force so as to equal the cutting rate obtained with the Buttress saw.

With all factors held constant, the Buttress type band required 39 pct more feeding pressure than the Claw Tooth saw. Likewise a second comparison shows that with the same feeding force applied to both type saws, the Claw Tooth cutting rate was 48 pct faster.

For General Use — Hard edge, disposable carbon steel Claw Tooth saw bands cut fast through moderately tough ferrous metals and a wide range of nonferrous materials. In fact, they literally race through all free-machining materials where rapid chip production demands ample gullet capacity.

In cutting oak flooring and other hardwoods, a ¾-in. wide, 3-pitch Claw Tooth band lasted six times

longer than the 1-in. wide, 4-pitch spring temper blade previously used. The band was on continuous production, cutting flooring for 20 days or 160 hours before being replaced. It was still cutting well but had begun to lose its set.

Carbon steel Claw Tooth bands are available for all types of vertical and horizontal band sawing machines, in seven widths ranging from ¼ to 1½ in. and in four pitches (2, 3, 4 and 6 teeth per in.), a total of 18 blades. The relatively coarse pitches of Claw Tooth restrict their use to work sections from ¾-in. on up in thickness. Widths of 1¼ to 1½ in., the widest available in hard edge bands, are ideal for foundry applications and production woodcutting.

For Tough Problems — Demon high-speed steel saw bands stand up to long flexing over the carrier wheels of a band machine and bring to band cutting the recognized advantage of "red heat hardness." Retaining its hardness at temperatures of 1100°F, they can run at speeds considerably higher than that permitted with carbon steel blades.

With the greater tensile strength of the back of the band, higher band tension increases the straightness of cutting. The Claw Tooth style combines the mechanical advantages of positive rake teeth with these metallurgical advantages.

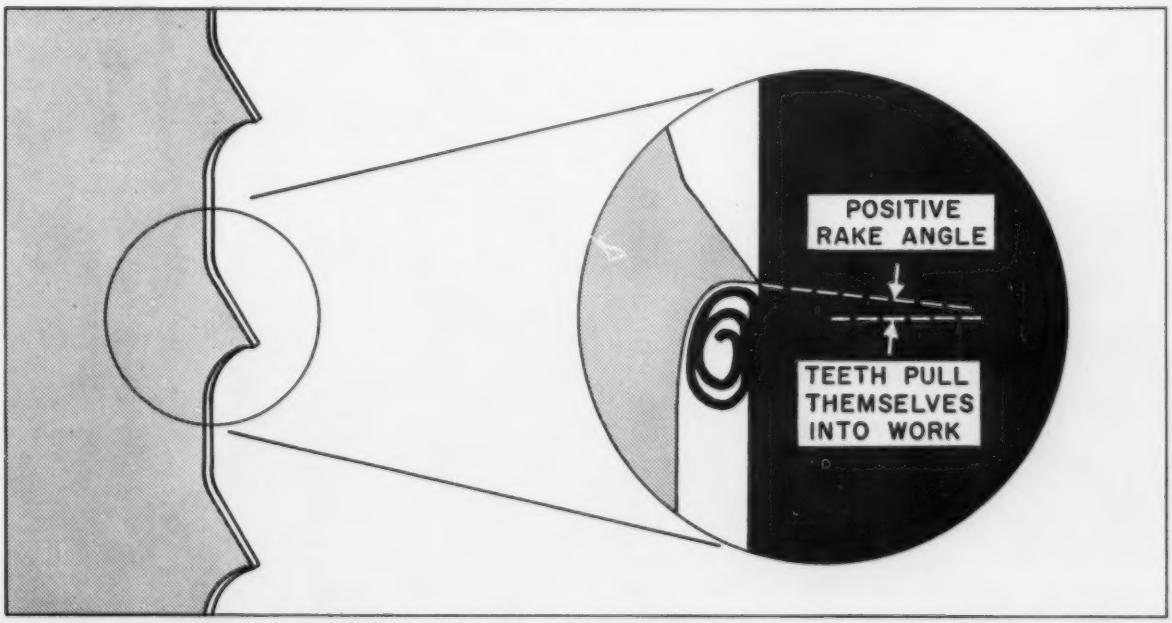
Long lived, the combination makes it much easier to cut such hard machining materials as titanium alloys and Ampco bronze. It's particularly well suited for stainless steel alloys.

Wide Selection — Demon Claw Tooth saw bands are available in six widths (¼, ½, ¾, 1, 1½, and 2 in.) and in four pitches, a selection of 13 blades. In the 1-in. width, all four pitches (2, 3, 4 and 6 teeth per in.) are available for the DoALL Power Saw, a heavily powered unit designed to use this blade for cut-off work.

In the 1-in. width, three different gages are used, depending on application. The normal gage is 0.035 in. The 0.042-in. gage permits greater beam strength for extreme accuracy in cut-off work on high alloys and heavy sections. It's recommended for use on tool steel, stainless steel, high temperature alloys and titanium. The 0.050-in. gage, accurately cuts heavy sections on large capacity contour sawing machines.

Benefits of Positive Rake

SAW TYPE	BUTTRESS	CLAW TOOTH
Saw width, in.	½	½
Saw set, in. (nominal)	0.043	0.046
Saw velocity, fpm	150	150
FEED FORCE, lb (at constant cutting rate of 1.10 sq in./minute)	25	18
CUTTING RATE, sq in./minute (at constant feed force of 25 lb)	1.10	1.63



HOW IT WORKS: Careful gullet design and band metallurgy insure maximum effectiveness of positive rake angle.

Metallography Solves A Tough

By A. J. Belli—Project Engineer, Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.

With just two pieces of lab equipment—a microscope and a hardness tester—it's possible to solve many complicated machining problems.

Here is a step-by-step report on how a difficult drilling problem was solved for tough, valve-guide castings.

▪ Have you ever wondered about the best way to tackle a highly complex machining problem?

If so, here is an approach followed at Wright Aeronautical Div., Curtiss-Wright Corp., that's worth some serious thought. What makes it especially attractive is its simplicity and directness.

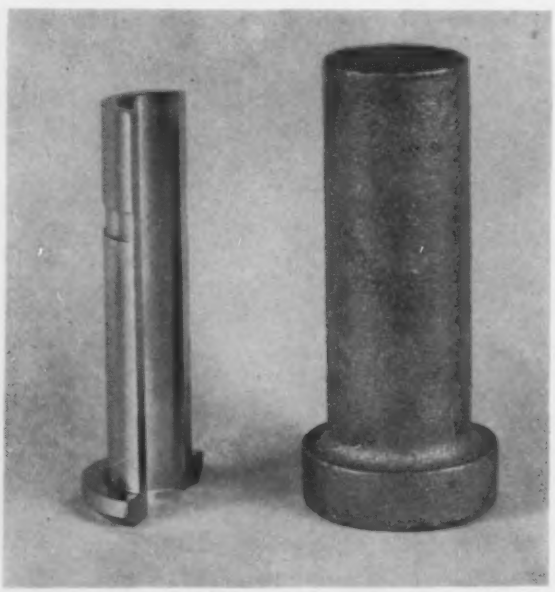
In this case, the machining problem was sufficiently complex and difficult to seriously hamper aircraft engine production. But it was solved in jig time—thanks to an analysis that combined routine hardness measurements with conventional metallography.

The problem centered about a wear-resistant, iron-base, alloy casting from which aircraft engine valve-guides are made. The cast alloy, containing about 27 pct chromium and 2.5 pct carbon, had long since proven its superiority in terms of engine performance. But even under good conditions, it was fairly difficult to machine.

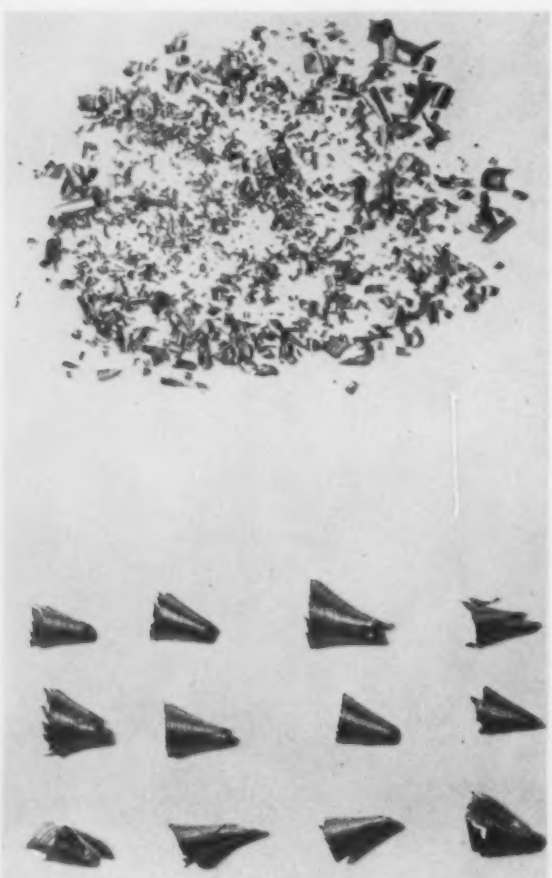
Castings Vary—Since the castings were purchased from a number of different foundries, certain variations in chemical analysis, hardness, and heat treatment could be anticipated. Within limits, these variations could be tolerated.

But serious machining problems arose just as soon as these limits were exceeded. All of which added up to the fact that the solution of any machining problem was likely to be found in the metallurgical characteristics of the castings.

Part of the machining of a finished valve-guide involves drilling

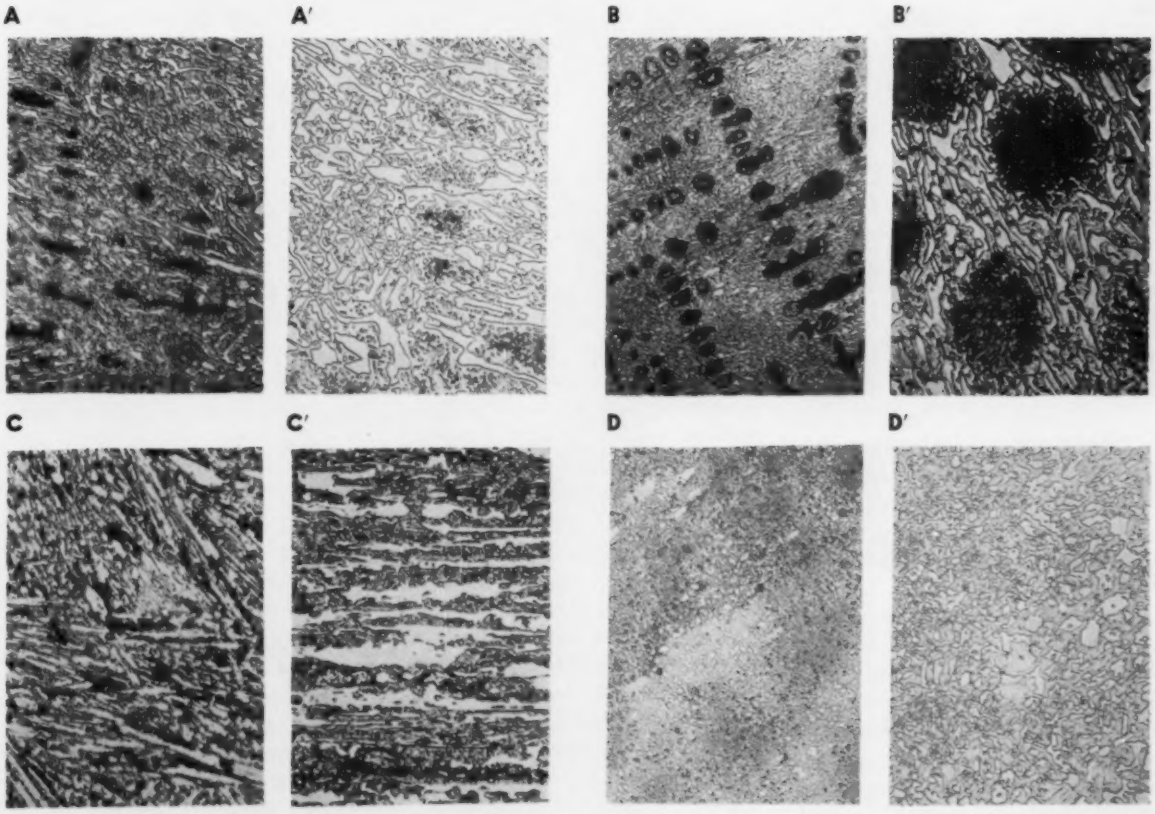


ABOVE: At left, a finished valve-guide is sectioned to show the center-bore finish requirements. At right, the valve-guide casting as it is received from the foundry.



RIGHT: Note the difference between the spiral chip form (left) produced by machinable castings and the granular chip (right) indicative of castings difficult to machine.

Machining Problem



KEY STRUCTURES: Microstructures typical of those found in valve-guide castings are shown at 100X (left) and 500X (right). Structures A, A', B, and B' are all machinable. Structures C and C' are less machinable and should be avoided. Structures D and D' are very difficult to machine.

and reaming a center-bore through the entire length of the casting. Because of the toughness of the material and the dimensional accuracy required, this is seldom an easy operation. It becomes a serious machining problem when drills have to be resharpened three or more times before they can complete the piercing of a single casting.

Melting Control — Metallurgical analysis of the overall problem started with a review of the chemical compositions of a number of heats from different foundries. This information was readily available since it was submitted by the foundries along with each lot of castings delivered.

While a review of melt chemistry could not be expected to solve the machining problem, it did serve to point up one possible source of trouble—foundry melting practice. As a general rule, the more machinable castings could be traced to the foundries with close control of melt chemistry. Those castings that showed a "loose" control of chemical composition were more likely to contain a higher percentage of non-machinable castings.

Some idea of the spread in chemical compositions resulting from close control and "loose" control can be gained from a study of the three alloying elements considered most likely to affect relative machinability. In all instances, the foundries with close melt control were holding all three elements within fairly tight limits.

Trouble With Tools—Both machinable and non-machinable castings from selected heats were "shop tested" on the basis of the degree of difficulty encountered in the center-bore drilling operation. Non-machinable castings rapidly dulled production drills and resulted in either breakage or excessive tool wear.

Shop-tested castings were then sectioned horizontally, and Rockwell hardness readings were obtained on ground, parallel sections.

A set of metallographic standards and a maximum allowable hardness limit solved the problem of inspecting castings for machinability.

Results seemed to indicate that castings with a hardness above Rc 38 could not be satisfactorily machined.

Still, this apparent hardness maximum could not be accepted as a final standard for rejecting castings. For while hardness contributes to relative machinability, it cannot safely be used as a sole criterion.

Important Combination—A sounder, more dependable approach is likely to be found if machinability can be directly related to a combination of hardness and microstructure.

To attempt to set such a standard, sample castings from a variety of heats were test drilled. Machinable samples were segregated from those which could be drilled only with difficulty—if at all. Tests were run on a single production lathe, using drills which would normally be used in day-to-day operations.

In the non-machinable category were some castings that required that the drill be resharpened as many as three times before the bore was completed. To complete the bore, the operator was obliged to "back off" the drill from the work at frequent intervals. Were he to fail to "back off," the drill would tend to bind or overheat.

The chip form of non-machinable castings was similar to a highly abrasive powder. These tiny particles, as it turned out, were directly related to the microstructure. Under the microscope, they showed up as closely-packed carbides in a structure that was virtually devoid of a dendritic pattern.

Analyze Microstructure — With one machinable heat, drill life was extended to 24 pieces per grind. These castings produced a spiral-type chip form about ⅜ in. long.

The microstructure of this heat consisted of a partially dendritic structure. Angularly shaped carbides were well dispersed throughout a mainly ferritic matrix. At higher magnifications, it appeared that the individual dendrites were made up of fine carbides. These, presumably, represent some intermediate stage of precipitation prior to total coalescence.

Here, then, were two microstructures — markedly different — that could be related to machining characteristics. Still, complex carbides of chromium and chromium and iron are known to take a wider variety of crystallographic forms. For this reason, it was necessary to extend the investigation so that other structures could be correctly classified.

Broad Sampling—Castings from 26 different melts were checked for hardness and examined metallographically. Of these, only one-third was found to be machinable. The entire sampling, however, was broad enough to provide an adequate cross-section of both machinable and non-machinable structures.

These microstructures were then classified as being predominantly of one structure or another. A mixture of structures in a single casting is common in the valve-guide alloy. However, it is the predominance of a particular structure that most affects machinability.

The Fe-Cr-C phase diagram indicates the preferential formation of a primary and a secondary carbide at different energy levels. Both carbides are bound to occur in the valve-guide alloy. These carbides are of different chemical composition.

Fortunately, these carbides also differ crystallographically: One is trigonal, the other orthorhombic. This means that the two carbides can be expected to appear as different structures under the microscope.

Different Carbides—The primary carbide (trigonal) predominates in most structures. At times, it appears in an acicular form. It may also appear as an intermixture in a dendritic structure. It is highly stable and does not tend to decompose at elevated temperatures. For this reason, it is almost entirely unresponsive to heat treatment.

Prior research has shown that only a limited rounding of these carbides can be achieved even after prolonged heating at temperatures above 1830°F. The size and shape of these carbides appears to be controlled primarily by section size and casting practice.

Secondary carbides in the groundmass can be readily dissolved, precipitated, or spheroidized by heat treatment. A long time treatment at 1470°F or above results in complete spheroidization. Under these conditions, the groundmass becomes entirely ferritic.

Problem Solved—Since annealing treatments are limited primarily to altering the groundmass, the degree to which the alloy may be annealed is severely limited. It depends upon the relative percentages of the structure occupied by the groundmass as compared with unaltered primary carbides.

Because these castings cannot be readily annealed to a machinable condition, their as-cast structure and hardness are of prime importance from a shop standpoint. These two factors combine to determine whether or not the castings can be machined.

By developing a set of metallographic standards and determining a maximum limit of allowable hardness, the problem of inspecting these castings in terms of their machinability was solved. All non-machinable heats could be readily identified and rejected.

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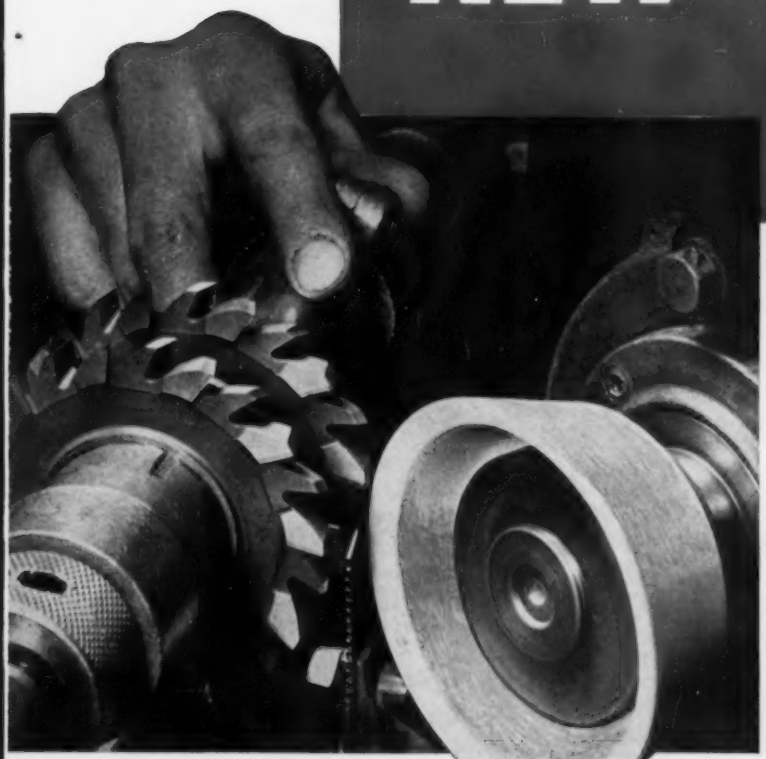

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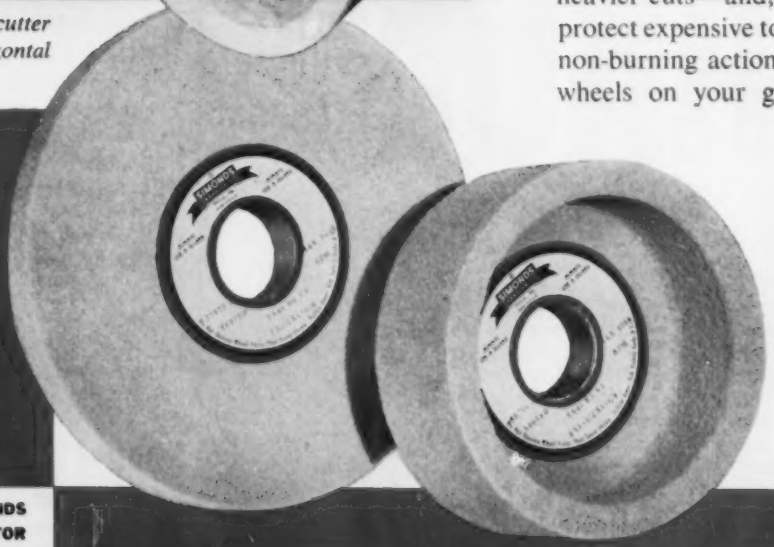

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FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 105.

Solenoid Valve

Development of a new solenoid valve is announced in a data sheet. Available in brass or stainless steel, the two-way valve can be used for air, gas, water, oil and all common industrial fluids. (A-P Controls)

For free copy circle No. 1 on postcard, p. 105

Strap Feeder

A 4-page folder introduces a new power steel strap feeder. It tells how the feeder rapidly and conveniently feeds vertical straps around large packages or skid loads. (Signode Steel Strapping Co.)

For free copy circle No. 2 on postcard, p. 105

Fork Trucks

Potential purchasers of electric fork trucks can now impartially evaluate various types and models through a comparison chart. The chart enables users to survey simultaneously the operating, design and maintenance characteristics of three different trucks by filling in appropriate categories. (Lewis-Shepard Products, Inc.)

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Teflon Hose

An industrial catalog supplement describes Teflon hose and industrial reusable fittings. (Titeflex, Inc.)

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Masking Tapes

Technical properties of masking tapes are reviewed in a brochure. It also covers various industrial applications for them. (Minnesota Mining and Mfg. Co.)

For free copy circle No. 5 on postcard, p. 105

Coal

In 36 pages, a brochure gives a complete description of the personnel capabilities, physical facilities and products of a large coal equipment company. (McNally Pittsburg Mfg. Corp.)

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Inspection Method

How you can make the best use of a firm's magnetic particle inspection facilities is told in a folder. It tells how this may cut costs of casting production. (Lebanon Steel Foundry.)

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Steel-plant Equipment

Products and experience of one company as applied to steel and related industries is the subject of a 40-page photo brochure. More than a hundred installation photographs and drawings appear. (Elliott Co.)

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Gages

Proper care and handling of gages is explained in a new catalog, a section of which also deals with the method of ordering gages and just what to specify when doing so. Fin-

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ishes and tolerances are clearly designed with ranges given according to American gage design standards. (Dorsey Gage Co., Inc.)

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Deionizers

Plastic deionizers described in new literature offer service flow rates of 5 to 120 gph. Each deionizer is shipped ready for ion exchange and adsorption problems or to supply demineralized water. (Ion Exchange Products, Inc.)

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Bearing Units

Bearing units consisting of pillow blocks and flange blocks are outlined in a catalog. A compact design and light weight are achieved in the pillow blocks and flange blocks by the use of malleable housings that are strong and virtually indestructible. They contain self-aligning ball bearing units lubricated for life and permanently sealed against contamination. (Browning Mfg. Co.)

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Lift Trucks

Features of late model walkie-stacker electric lift trucks are described in three brochures. The truck's lifting capacities rate: 2000, 2500, and 3000 lb. The 2000-lb model features a 135-in. lift height. (Automatic Transportation Co.)

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Drilling

A 4-page folder explains advantages of electrified drive systems for oil well drilling. (General Electric Co.)

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Machine Safety

In a new bulletin there is illustrated a pliable, way-protection that opens to 90 ft on both sides of a tool column and closes to a minimum of 24 in. Any width and/or lengths can be supplied to order; there are no size limitations. Neoprene-base materials are fabricated into a design that combines fabric, steel-clamping plates and aluminum stiffeners. Primary uses: milling and

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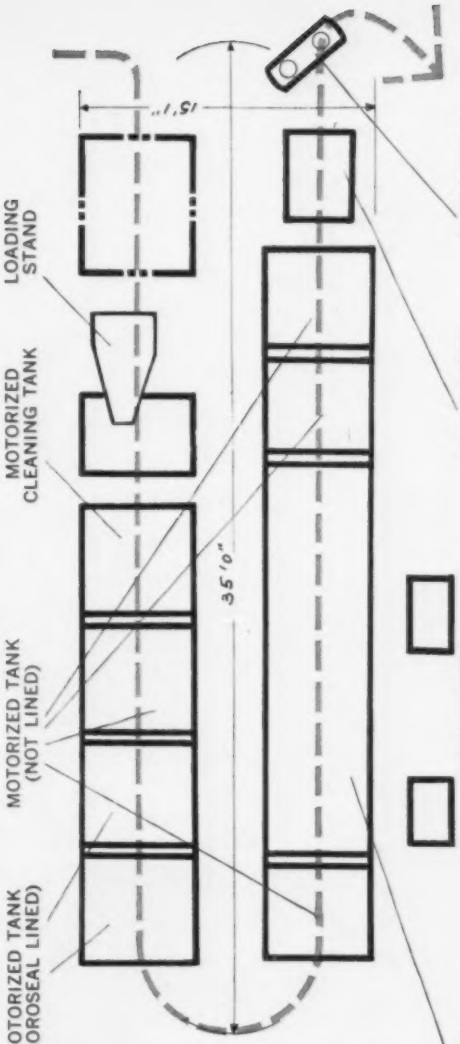

Here is a typical alkaline or acid barrel plating plant layout designed by the UDYLITE Engineering Department for fast, efficient metal finishing. This system, with the proper UDYLITE equipment placed in a practical flow chart pattern, comprises the ultimate in modern plating production.

Naturally, different plant limitations and end-products require an individually planned layout. For this reason, the UDYLITE Engineering staff and their knowledge are available to you for your particular shop needs. If a modern, money-saving plating plant is your goal . . . why not let UDYLITE help you plan it!

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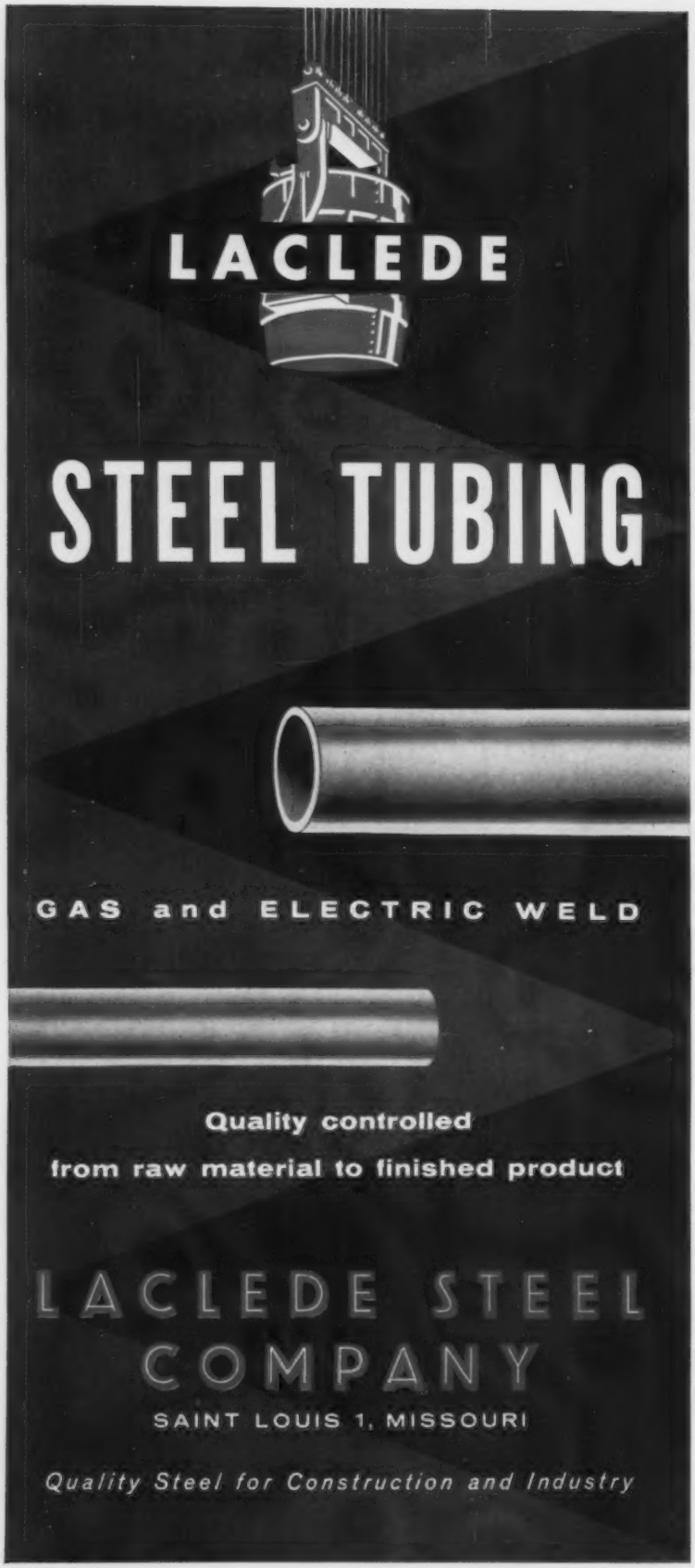

FREE LITERATURE

boring machines, boring bars, grinders, lathes and jib borers. (A&A Mfg. Co., Inc.)

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Hacksaw Blades

High-speed steel power hacksaw blades are featured in a 4-page catalog. These "soft-back" blades can be fully reconditioned (not just reground but also reset and rehardened) under the price of new blades. (R. B. Tool Co., Inc.)

For free copy circle No. 15 on postcard, p. 105

Shaft Mounted Drive

A 32-page bulletin describes all-steel, helical gear, shaft mounted drives. These units range from ½ to 50 hp, 420 to 5 rpm output speed. (The Falk Corp.)

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Chucks

Chucks, collets and chucking equipment appear in a 23-page chuck catalog. It also includes information on power chuck wrenches, air cylinders and a section on special work-holding equipment illustrated by job applications. (Gisholt Machine Co.)

For free copy circle No. 17 on postcard, p. 105

Sweeper

Currently available literature describes a new battery powered sweeper. Using two 12-v industrial type batteries with a minimum of 360 amp hours, the sweeper can work a full 8-hour sweeping shift without recharge. Wilshire Power Sweeper Co.)

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DC Crane Control

An 8-page bulletin describes a new line of front connected direct current crane control panels. It discusses panel design advantages and provides typical speed-load and torque-speed performance curves. (General Electric Co.)

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1500-ton hydraulic free-forging press in operation at one of the leading mills for specialty steels. Manipulator is at left, high-pressure water station at rear, scale remover chute at bottom.

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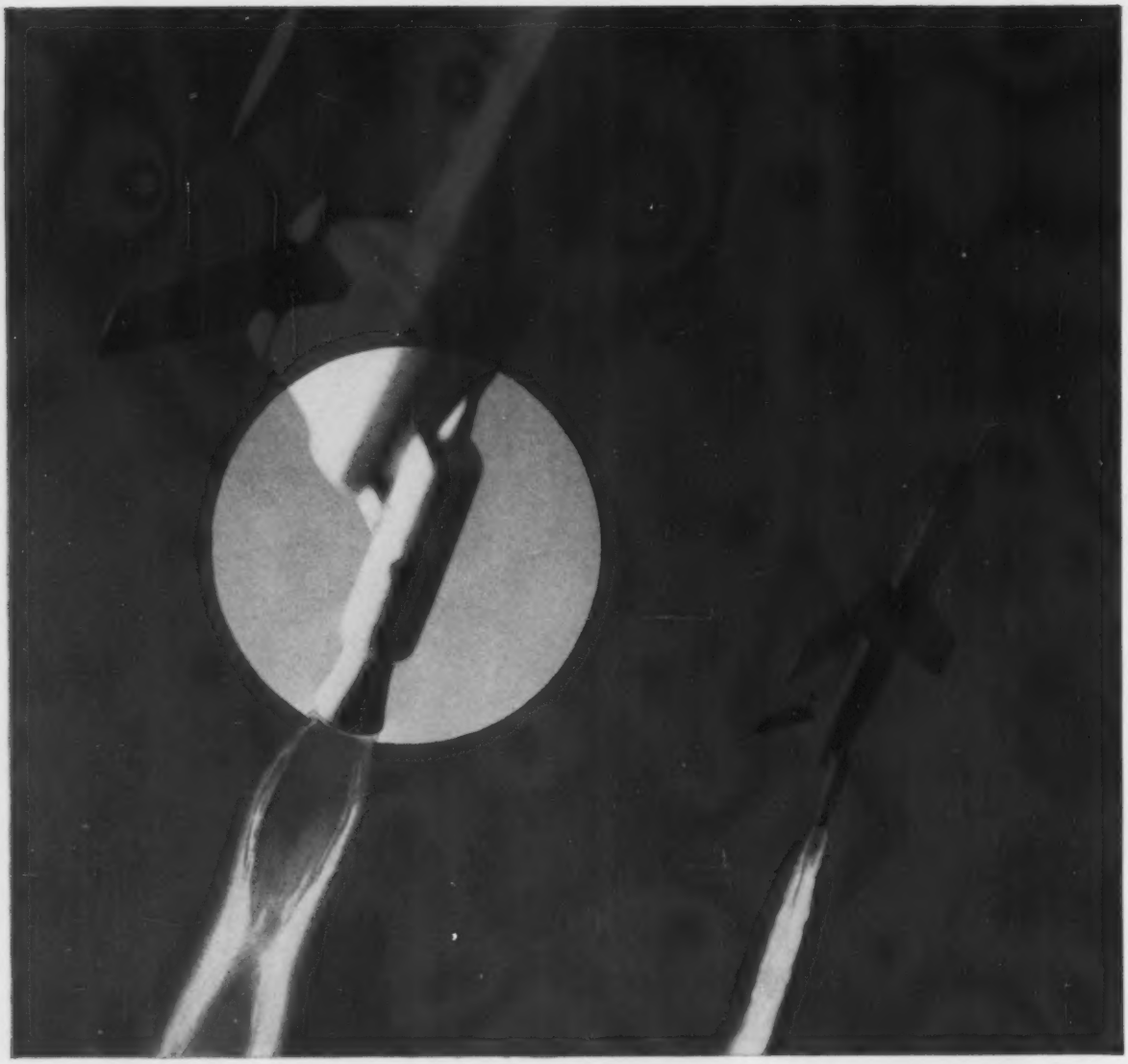

ONE-PIECE WELDED CONE FOR THE HOT SPOT

This is the vital nozzle cone of the Martin Mace guided missile. American Welding was able to form it in one piece from ¾-inch plate (FS-1020) and arc weld the joint to produce a tapered cone with a major diameter of 25 inches and a minor diameter of 15 inches. After heat treating and X-ray testing, it proved to be better and more economical than nozzle cones produced by the previous method of forming in two halves.
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FREE LITERATURE

Continued

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

Cold Flowing

A 6-page folder introduces a process for cold flowing various metals into tubular forms of all sizes and shapes. (Claude C. Slate Co., div. of Darco Industries, Inc.)

For free copy circle No. 20 on postcard

Strong Plate

High-strength steel plates are outlined in a folder. The folder describes the plates as being lighter in weight, yet stronger than carbon steel of the same thickness. In addition, they have good welding properties and are more resistant to atmospheric corrosion than carbon steel, it says. (Colorado Fuel & Iron Corp.)

For free copy circle No. 21 on postcard

Industrial Heater

A 26-page bulletin describes features of an industrial heater. It also includes a discussion of selection and application of steam coils, hot water coils and unit size. (American Air Filter Co., Inc.)

For free copy circle No. 22 on postcard

Metal Stitching

"Metal Stitching, a New Idea in Fastening" is the title of a 16-page booklet. It tells about stitching metal to metal or metal to non-metallic materials. (Acme Steel Co.)

For free copy circle No. 23 on postcard

Lube Automation

A 20-page hydraulics and lubrication manual for automated special machine tools is now available from a large machine-tool builder. Instruction for general hydraulic and lubrication system maintenance are included along with a discussion of lubricants and a lubrication chart. (Snyder Tool & Engineering Co.)

For free copy circle No. 24 on postcard

Fork-truck Safety

Tips on operating fork lift trucks more safely are contained in an 8-page brochure. Among topics discussed: selecting operators, classroom instruction, driving instruction and maintenance responsibilities of the trained operator. (Lewis-Shepard Products, Inc.)

For free copy circle No. 25 on postcard

Snagging Wheels

Snagging wheels for the removal of metal surface imperfections are described in a 4-page bulletin. Illustrations show typical applications on small castings and steel slabs, and the available range of standard wheel shapes. (Simonds Worden White Co.)

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Ballizing

The ballizing process (forcing a ball through a part for hole sizing and/or finishing) is explained in a 16-page bulletin. It includes a description of automatic ballizing machinery capable of sizing holes at a rate up to 4500 per hour. (Industrial Tectonics, Inc.)

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Lubricator

Solenoid - operated lubricators which distribute lubricating oil from self-contained reservoirs are described in a technical reference. Such automatic lubricating devices can adapt to many types of machinery. (Bijur Lubricating Corp.)

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Quick Couplings

Quick - connecting air couplings are covered in a catalog. These couplings are specifically designed for use with industrial vinyl hose. They can be used with other air hoses also. All couplings are brass, with

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FREE LITERATURE

stainless steel springs and valves. Plugs are furnished in cadmium-plated steel or brass, which means that the the coupler can be readily used for water and other fluids. Capacity is 125 PSI. (Hofmann Engineering Co.)

For free copy circle No. 29 on postcard

Plating Solutions

Simple methods for analyzing plating solutions are reviewed in a 36-page booklet. (Hanson - Van Winkle-Munning Co.)

For free copy circle No. 30 on postcard

Refractory Units

Refractory brick presses are detailed in a 12-page manual. It gives specifications, clearance data, general arrangement drawings and operating characteristic data on two new models. (Chisholm, Boyd & White Co.)

For free copy circle No. 31 on postcard

Bright Dip Bath

For use in nitric-phosphoric acid bright dip baths, a liquid addition agent restores the lustre producing properties of bright dips. It's fully described in a technical data sheet. (MacDermid Inc.)

For free copy circle No. 32 on postcard

Thread Gages

Precision cutting tools and gages are detailed in a 12-page catalog. Precision thread comparators of both external and internal type are featured. (Hanson-Whitney Co.)

For free copy circle No. 33 on postcard

Heat Exchangers

Heat exchangers are discussed in a bulletin. Among principal features illustrated are: baffles with a special flanged lip at each tube hole and around the rim for tighter tube fit and improved thermal characteristics; stamped steel feet movable in three positions around hubs for easy, more adaptable mounting; corrosion resistant copper alloy core assembly; hubs relieved under connections for unrestricted flow. (Ross Heat Exchanger Div., American-Standard).

For free copy circle No. 34 on postcard

Fork-lift Maintenance

Lift truck operators get tips on care and servicing of materials handling equipment in a pocket-sized Manual. (Towmotor Corp.)

For free copy circle No. 35 on postcard

Holding Magnets

Engineers who design magnets for various types of holding assemblies might find interesting a piece appearing in a company's publication. Complex equations are eliminated by the method discussed. Instead, high school algebra is used to obtain magnet dimensions. (Indiana Steel Products Co.)

For free copy circle No. 36 on postcard

Vibration Control

Engineering specifications and performance data for one firm's line of machinery mountings are given in a complete catalog. It presents 15 different types of machinery mountings. These utilize steel springs, rubber, and cork—either singly or in combination. (The Korfund Co.)

For free copy circle No. 37 on postcard

Speed-control Drives

Packaged drives for equipment requiring adjustable speed or speed synchronization are outlined in an 8-page bulletin. It describes drives which incorporate in one package the elements of adjustable-voltage dc drives. (Clark Controller Co.)

For free copy circle No. 38 on postcard

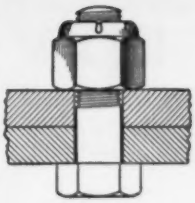
Corrosion Control

Filming type amine for controlling corrosion in steam condensate systems is introduced in a bulletin. It tells how the product controls corrosion, removes iron oxide deposits, increases heat transfer, reduces maintenance and replacement costs, and protects steam condensate systems during standby periods. (Hagan Chemicals & Controls, Inc.)

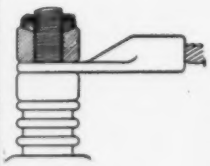
For free copy circle No. 39 on postcard

Ten fastening problems solved by ELASTIC STOP® nuts

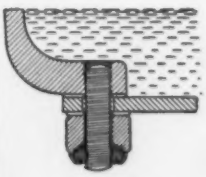
TIGHTENED AGAINST THE WORK



Vibration and impact proof bolted connections in standard applications.

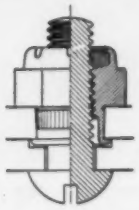


On all electrical terminals subjected to vibration in transit or operation, and for any electrical or electronic assembly where positive contact must be maintained.

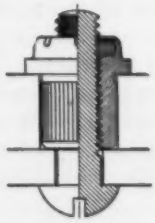


To seal bolt threads where leakage past stud threads must be prevented.

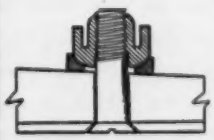
FOR MANY SPECIAL FUNCTIONS



Blind fastening applications where nut is "clinched" into sheet metal . . . becoming self-retaining as well as self-locking.

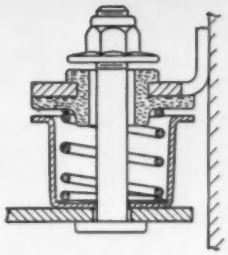


To eliminate drilling and tapping and provide steel thread strength for soft metals, an ESNA spline nut is pressed into a bored hole in casting.

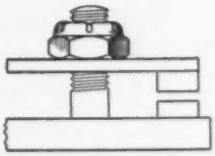


Simplified self-aligning self-locking fastener for bolting two non-parallel surfaces.

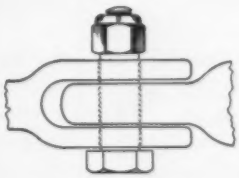
LOCKED ANYWHERE ON THE BOLT



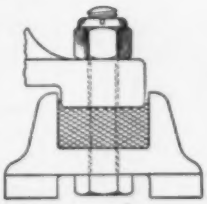
Spring-mounted connections or dynamic balancing, where nut must stay put yet be easily adjusted. (Flanged face eliminates need for extra washers.)



On make and break adjustment studs where accurate contact gaps must be maintained. Note "thin" height design for limited clearance.



For bolted connections requiring predetermined play.



For rubber-insulated and cushion mountings where the nut must not work up or down.

HOW THESE NUTS SOLVE SO MANY FASTENING PROBLEMS, ELIMINATING EXTRA PARTS AND OPERATIONS...

The red locking collar of an ELASTIC STOP® nut grips bolt threads with a perfect fit that will not loosen under severe vibration or stress reversals, and seals against liquid seepage. By bringing nut and bolt metal thread flanks into firm contact it eliminates wear producing axial play. The elastic locking action of the insert-type stop nut does not distort or gall bolt threads. It is reusable many times.

Send for the following free information: Elastic Stop nut bulletin; Rollpin® bulletin. Or enclose a drawing of your product for specific self-locking fastener recommendations. Write to Dept. N30-277.

ESNA

ELASTIC STOP NUT CORPORATION OF AMERICA
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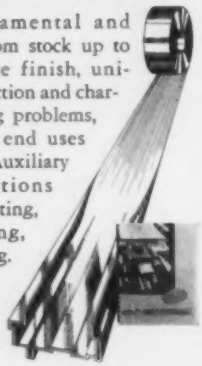
Structural, ornamental and tubular shapes from stock up to ½" thick. Surface finish, uniformity, stock selection and characteristics, plating problems, production costs, end uses and applications. Auxiliary automatic operations including perforating, notching, welding, coiling, embossing. 88 pages, fully charted and illustrated.



PIPE AND TUBE MAKING

Ferrous or non-ferrous, electric weld, resistance and induction or gas types. Small or large diameter. Tooling, welding, stock ranges personnel training, quality and tolerance control, speeds, power consumption, annual production rating charts. 64 pages, fully illustrated.

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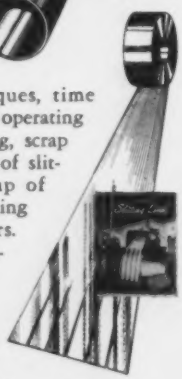
Operating techniques, time studies, analyses of operating cycles, coil handling, scrap disposal, selection of slitters and setting up of slitting lines, including coilers and recoilers. Advantages of slitting and how to compute "profit-point". 76 pages, fully illustrated.



Any or all of these books are free upon requests. Send for your copies today . . . Ask for them by title.

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TECHNICAL BRIEFS

Fast Liquid Supply Speeds Production

The faster your liquid supply system delivers lubricants, hydraulic oils or coolants, the faster your possible output becomes.

Whether it's feeding coolant through a machine-tool's recirculating system or supplying vital liquids to a 40-mph cold rolling mill, efficiency is important.

▪ One of the most spectacular examples of the dependence of huge automatic industrial machinery on fluid circulation systems is in steelmaking. Elaborate piping systems are needed to deliver to a modern sheet steel rolling mill its cooling water and special coolants, lubricants, hydraulic oil and air.

For one of the fastest and heaviest sheet mills, which cold rolls sheet at 40 mph while reducing its thickness to one-third, Blaw-Knox Co., Pittsburgh, recently engineered and installed one of the most complex, compact, and accessible automatic piping systems. Everything but water is delivered to points of use from storage tanks in a 34 by 96-ft basement.

Doesn't Supply Water — The basement installation doesn't include the water system for cooling mill rolls. It also does not include the main part of a recirculating water system of 5000-gal capacity which contains piping in the oil storage tanks and to air coolers for drive motors in the motor room.

The principal machinery that depends upon these systems is a 77-in. four-stand, four-high, cold reducing mill. This was completed recently for Jones & Laughlin Steel Corp., Cleveland, at a cost of about $10-million. Nearly 23,000 hp is available from 10 electric motors that drive this mill.

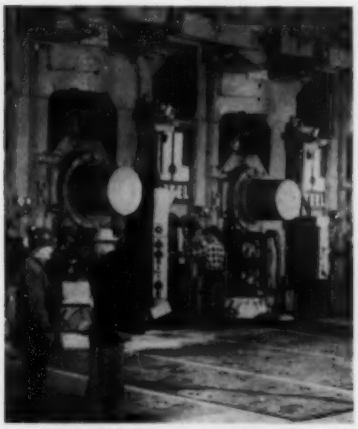
Stresses Color—The several systems that deliver lubricants and special roll coolant, and serve to operate the mill hydraulically and pneumatically are the most colorful in spite of being the least seen. System identification requires the use of all colors of the rainbow plus black, gray, and aluminum to distinguish five lubricating oil systems, two pressure grease systems, an oil emulsion coolant system, a 3500-psi hydraulic system for maintaining roll balance, a 1000-psi hy-

This is part of the intricate liquid-supply system . . .

Want More Data?

You may secure additional information on any item briefed in this section by using the reply card on page 105. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

draulic system for operating 14 mill controls, a compressed air system for 18 mill controls, and a steam system for maintaining lubricating oil temperature when the mill is idle. All of these systems are fully automatic and require no attention except occasional adjustments to assure continuous, trouble-free operation.



. . . that helps this rolling mill work at a 40-mph clip.

Much of the basement space is taken by storage tanks which hold approximately 56,000 gal of various types of lubricants and cooling oil emulsion.

When Bolting: How Tight Is Tight?

How do you determine the right torque for proper tightening of bolts according to specific requirements? Obviously the answer is not the mere tightening of a bolt as far as it will go.

An overstressed bolt can fail just about as easily as one which isn't tight enough. So a basic question in design is how much tightening torque is required to develop the best bolt tension.

Here's Some Ideas—According to a report just released by Skidmore-Wilhelm Mfg. Co., Cleveland, the following factors are the main ones to consider in determining the proper torque: (1) size of bolt, (2) type of nut and washer, and (3) type of thread.

With these facts in mind, the firm

Platers find many uses for chelating *cleaner

*Chelating (pronounced key-lating) cleaners convert metallic salts and oxides into compounds soluble in water.

By chelating and removing rust or heat scale at the same time that it removes oil, Oakite Rustripper combines pickling and alkaline cleaning into one operation. It also avoids disadvantages of acid pickling, such as hydrogen embrittlement and etching of machined surfaces.

Platers now use Rustripper for dozens of difficult steel-cleaning jobs. Here are some examples reported in recent weeks:

CALIFORNIA: "Rustripper has ended pickling damage such as embrittlement." (Removing oil and light rust from machined landing gears before cadmium plating.)

NEW YORK: "Now saving about $10.40 per day on removing rust and scale and producing brighter plate." (Rustripper, added to reverse current cleaner in automatic plating machine, has eliminated separate pickling of wire towel racks before nickel and chrome plating.)

INDIANA: "Rustripper is the best barrel compound we ever used for this job." (Removing tough heat treat scale from steel screws.) "Total cleaning and zinc plating time has been cut in half."

NEW JERSEY: "Only two cleaning rejects in first 15,000 parts plated." (After Rustripper was added to reverse current cleaner in automatic plater to eliminate smut from tubular steel furniture.)

NEW YORK: "Had trouble with light rust on business machine parts before cadmium plating; also with smut left after electrocleaning. Rustripper cured both troubles."

FREE A 14-page illustrated booklet called *"Here's the best shortcut in the field of electroplating"* tells about many ways in which Oakite Rustripper can be of great value in the plating shop. Write to Oakite Products, Inc., 25A Rector St., New York 6, N. Y.

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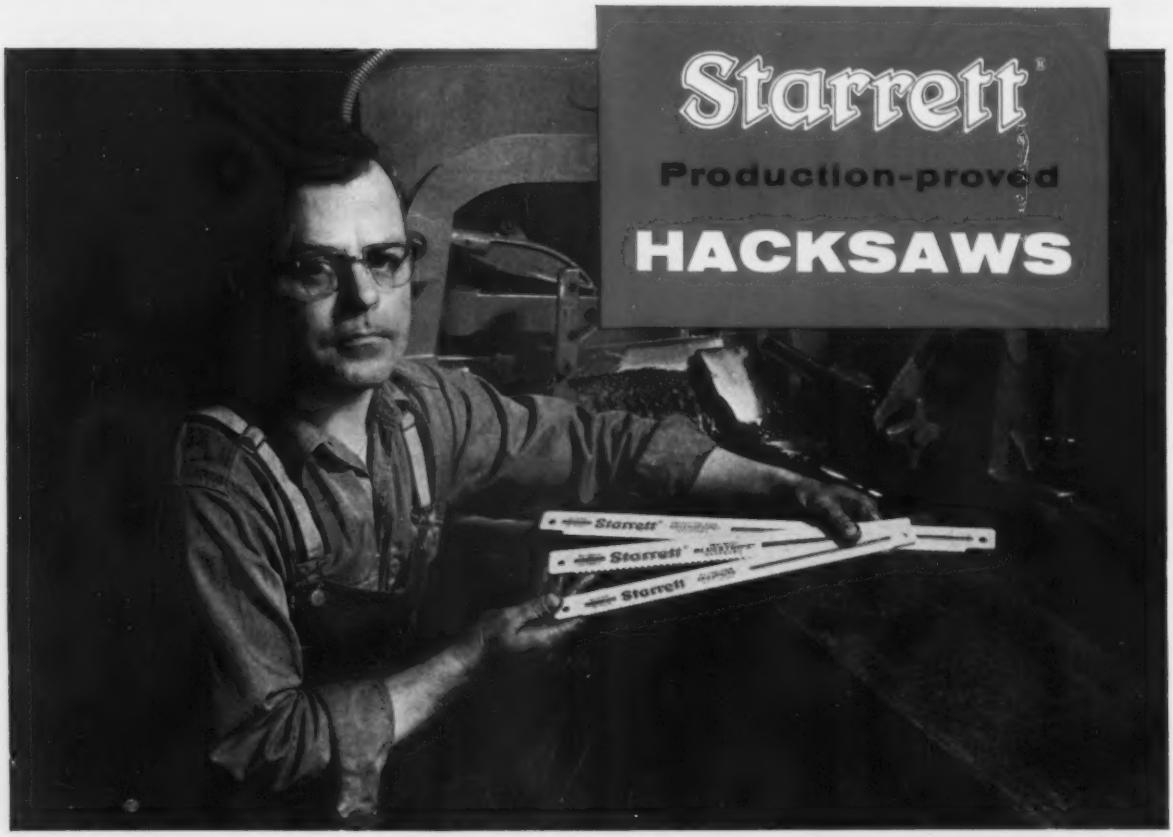

Named and color identified to help you specify the right blade for low cost, fast cutting, long life

Colorful hacksaw blades with easy-to-remember, colorful names — a plus value that makes Starrett Production-Proved Hacksaw Blades easy to specify and easy for shop men to identify.

Bright yellow blades with the *red stripe* are Starrett REDSTRIPE SM* High Speed Hand and Power Blades . . . extra tough, long-wearing special alloy high speed steel blades recommended for production work and run-of-the-shop jobs.

Yellow blades with the *green stripe* are Starrett GREENSTRIPE SAFE-FLEX* High Speed Hand and Welded Edge Power Hacksaws . . . shatterproof, unbreakable blades — *the safe* blades for heavy feeds, gang sawing and interrupted cuts.

Yellow blades with the *blue stripe* are Starrett BLUESTRIPE* High Speed Hand and Power Hacksaw Blades made of selected high speed steel especially heat treated for high speed production sawing and hard-to-cut metals.

Your nearby Industrial Supply Distributor has these Starrett Hacksaw Blades in a complete range of hand and power sizes. Call him for quality products, dependable service or send for Starrett Hacksaw Catalog which gives complete application data. Address Dept. IA, The L. S. Starrett Company, Athol, Massachusetts, U. S. A.

*Registered trade names

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PRODUCTION-PROVED HACKSAWS

World's Greatest Toolmakers

STARRETT TOOLS

PRECISION TOOLS • DIAL INDICATORS • STEEL TAPES • GROUND FLAT STOCK • HACKSAWS • HOLESAWS • BAND SAWS • BAND KNIVES

points out that it's then necessary to consider the manner in which torquing energy is distributed when a bolt is tightened. This is done by holding the nut and applying torque to the bolt head. If hole alignment is correct, thread fit not too tight, and clamping surfaces approximately parallel, torque energy is distributed in three ways.

Overcomes Friction—About 50 pct of the torque is absorbed in overcoming friction under the bolt head. At this point, there is a sliding action under tremendous pressure. Approximately 40 pct of the torque is absorbed in overcoming friction in the threads, another point where there is a high sliding friction.

Thus, the report points out, only about 10 pct of the applied torque creates tension in the bolt itself. Relatively small changes in the friction under the bolt head, or in the threads, may well have considerable effect on the resultant bolt tension for a given applied torque.

New Stoppers Improve Pouring of Steel

Improved practices in pouring molten steel at the Gary, Ind., Works of U. S. Steel Corp. have resulted from the use of modern techniques and efficient components. Among the latter are hydraulically-operated stopper mechanisms.

Ladle stoppers open and close hydraulically, and reliably, through use of ½-in. double-check couplings made by Titeflex, Inc., Springfield, Mass. These couplings connect hydraulic lines leading from the pump to the auto-pour cylinder located on the ladle. Hydraulic pressure fed into the cylinder controls opening and closing of the ladle stopper to start and stop the pouring of molten steel into the molds.

Special Tools? No!—No tools or special skills are needed to connect

WHY TRY TO SOLVE YOUR GEAR PROBLEMS ALONE?

PERKINS can custom-cut a precision gear to fit your exact needs...make you a gear that guarantees full capacity and trouble-free performance. Many gear-makers promise a precision gear — Perkins delivers precision . . . always. Fifty-two years of gear-making for aircraft, automotive and instrument manufacturers assure top quality. Extensive facilities, modern equipment, rigid production and quality controls produce gears consistently uniform in tolerance with a burr-free micro finish. Perkins quality eliminates production delays and costly rejects for you . . . Perkins gears wear longer, cost you less in the long run. Ask us to quote on your next gear requirement. Then judge for yourself.

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Folder showing custom gears Perkins has made (from various materials) for aircraft, automotive, precision instruments, home appliances, portable and machine tools, and other products. Includes Perkins facilities for producing various gear types and sizes. *Write today.*

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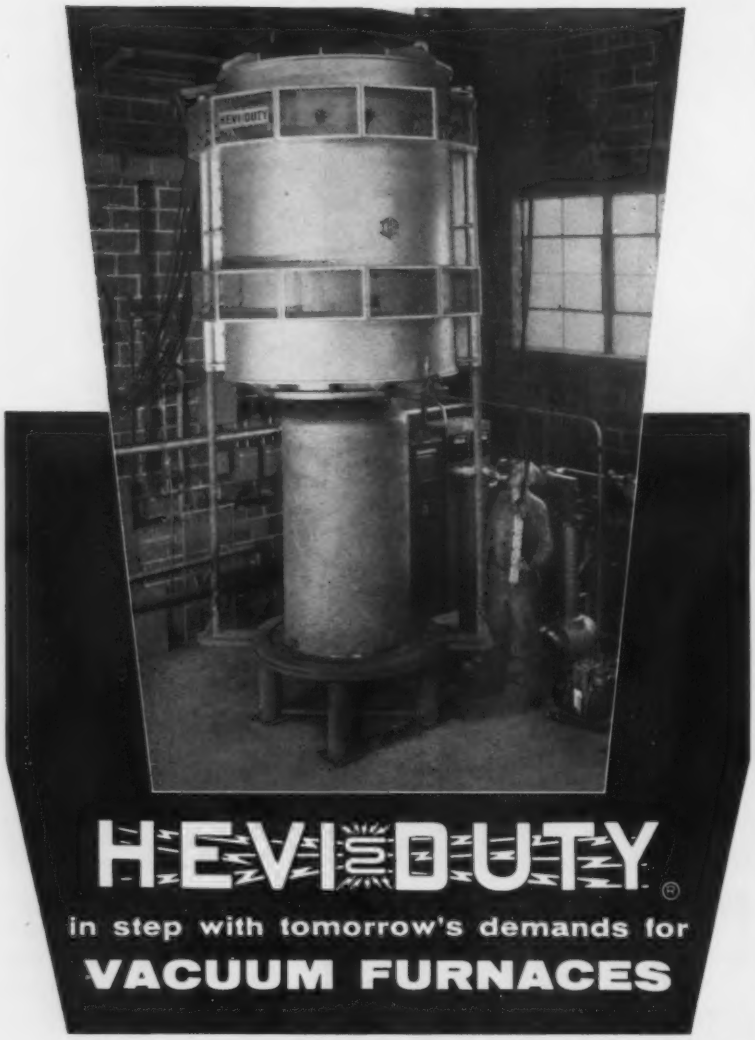

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in step with tomorrow's demands for

VACUUM FURNACES

Hevi-Duty builds pit, bell and elevator furnaces for single and double pump vacuum heat-treating applications. Water-cooled flanges perfect a vacuum seal between retort and furnace shell.

All types of Hevi-Duty furnaces can be built to accommodate a vacuum retort.

These standard features of Hevi-Duty vacuum furnaces provide economical and efficient operation:

- Clean, safe, easily regulated heat and long life are advantages of "Return Bend" heating elements.
- Proper temperatures throughout the furnace chamber are obtained by zoned heat control.
- Heat losses are minimized by layers of preformed and laminated insulation.

Write for Bulletin 557 for further information about Hevi-Duty vacuum furnaces.

HEVI-DUTY ELECTRIC COMPANY

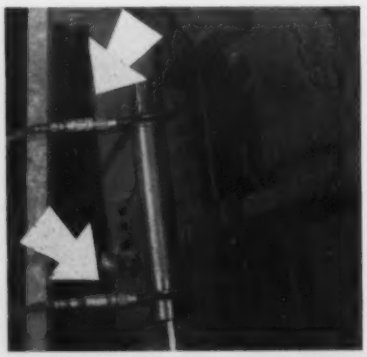
MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers *Constant Current Regulators*

or disconnect the couplings. They may be coupled or uncoupled quickly and easily. In the event of need for adjustment or when there is a breakdown, these quickly sealing couplings reduce the loss of hydraulic fluid.

When the repair or adjustment is complete, the crew can quickly hook-up the couplings of the pump



Pouring of steel is controlled via these couplings (arrows).

to the auto-pour cylinder on the ladle. Thus, pouring operations are speedily resumed.

Since these couplings help make possible pouring of molten steel by remote control, through electric start and stop buttons, the stopper in the ladle can be opened and closed when a crew member is a safe distance away from splashing, white-hot steel.

Clutch Stands Up

A magnetic-particle clutch completed more than 54,000,000 operations during recent testing, with no deterioration in performance. During the same test, the unit completed over 1000 hours of continuous testing. The unit, built by Lear, Inc., Grand Rapids, Mich., features a metallic-particle mixture which fills the air gap between the clutch body and the low-inertia disk. The clutch body rotates continuously. When energized, the metallic particles become magnetized and span the air gap, coupling the clutch body and disk.

Stainless Steel
machining information . . .

*Use a heavy cut, but slow

MACHINING Stainless Steel isn't difficult—but it's *different*. Most grades of Stainless should be machined at about *half* the speed of carbon steel. This stems from the fact that Stainless is tough, rather than hard, and it tends to seize and gall at higher tool speeds.

Sharp tools are *essential*, especially for austenitic (300 series) Stainless Steels. Dull tools will work-harden and glaze the piece. In fact, the work-hardening may be so bad that future cutting will actually be impossible. A heavy, slow cut will give the best results with almost any grade of Stainless.

Trial and error is *not* the best way to master Stainless Steel machining. We suggest that you refer to U. S. Steel's "Stainless Steel Fabrication Book" for service-tested fabricating ideas. If you don't have a copy of this 130-page book, write for it on your company letterhead to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

UNITED STATES STEEL CORPORATION, PITTSBURGH
AMERICAN STEEL & WIRE DIVISION CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
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USS STAINLESS STEEL

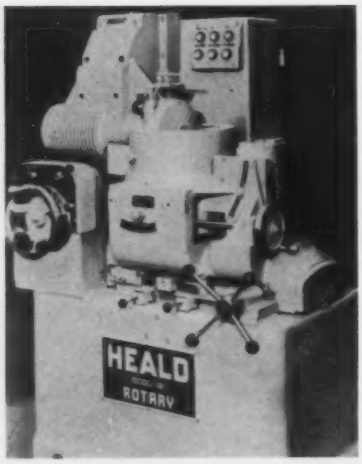
SHEETS • STRIP • PLATES • BARS • BILLETS
PIPE • TUBES • WIRE • SPECIAL SECTIONS

UNITED STATES STEEL

USS

New Production Ideas

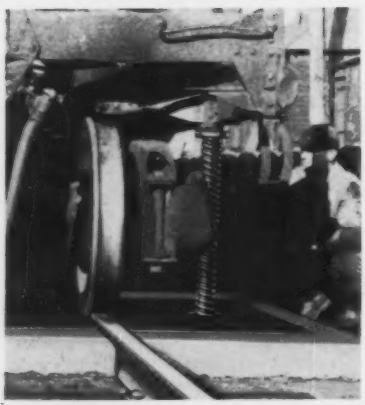
Equipment, Methods and Services



Rotary Surface Grinder Works 6-in. OD Pieces

Recommended by its maker for small work grinding operations on a high production job-lot basis is this rotary surface grinder. It grinds flat, convex or concave surfaces of work up to 6-in. OD. The column type machine produces finishes of 2 to 4 microinches in suitable types of material in routine production. It accommodates a wide range of relatively small work such as saw blades, slitters, gear cutters, matched angular contact bearings and similar parts. A key feature of the new machine is hydraulic control of the operating cycle. Automatic table reciprocation saves operator effort and permits high, uniform production on relatively long runs of identical parts. Hydraulic table feed rates are infinitely variable from 0 to 10 fpm to permit smooth, slow dressing speed and instant change to rapid traverse or reciprocating speed. This machine is available as a manual unit. (Heald Machine Co.)

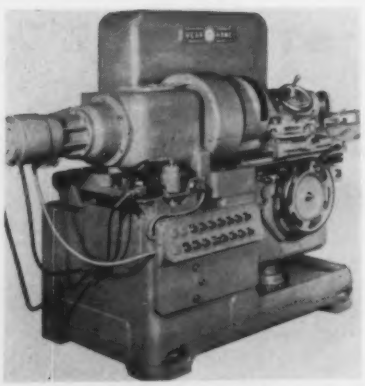
For more data circle No. 41 on postcard, p. 105



Jacks Lift Rail Cars For Quick Maintenance

Jacking railroad cars off their trucks for "spot" system maintenance may be simplified by a new packaged jack arrangement. It could apply to big railroad hump yards or smaller inter-plant railway installations. Cars requiring maintenance can be spotted directly over the jacking equipment. Five-way controls then position the car at a desired height up to 60 in. The entire installation can be covered by a shed, with controls spaced about 10 ft from the jacking unit. The unit consists of two spur-gear screw jacks coupled to a two-speed 25-hp electric motor with double shaft extension for proper synchronization. Each jack is equipped with two limit switches; these automatically shut off the motor at upper and lower limits of the rise. (The Joyce-Cridland Co.)

For more data circle No. 42 on postcard, p. 105



Gear Honing Machine Removes Nicks, Burrs

Performing hard gear finishing operations on spur and helical internal gears is this machine's job. The internal gear tooth honing machine can remove nicks and burrs, improve tooth surface finish and/or make minor tooth shape corrections in hardened gears. Both taper and crown honing operations can be done on it. The machine uses a special high-speed motorized workhead with a tilting arrangement that permits honing with either constant-pressure or zero backlash methods. The abrasive - impregnated, gear shaped, plastic honing tool which the workgear drives, is mounted in crossed axes relationship on a spindle head that is reciprocated by a slide during the honing operation. A handwheel adjusts the honing head to correct center position. (National Broach & Machine Co.)

For more data circle No. 43 on postcard, p. 105

TIPS FROM A ROLL MAKER'S NOTEBOOK

MACKINTOSH-HEMPHILL DIVISION, E. W. BLISS COMPANY, Pittsburgh 3, Pennsylvania

Cast mill rolls • Johnston cinder pots • rotary tube straighteners • end-thrust bearings • heavy-duty lathes • steel and special alloy castings

Tooling: key to longer roll life between redressings

Most difficult roll turning job done regularly at Mack-Hemp is dressing pipe mill rolls. Turning takes a week or more, with carbide tools reground three or four times per hour.

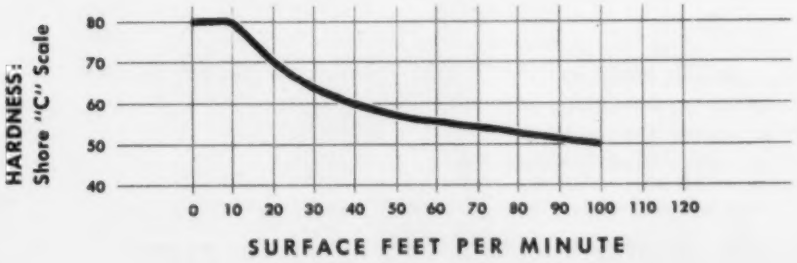
In a very important sense, block lathe turning practice sets the upper limit on the production-per-turn of every rolling mill in a plant. The reason is obvious. If the roll shop won't turn rolls whose hardness is above a certain figure, then the extra wear resistance of these harder rolls can never be brought into play.

In investigating roll shop machining techniques, we've found that many roll shop men are often not fully informed of the remarkable increases in turning speeds, feeds and depths of cut made possible by carbide tools. High speed cutting tools can dress rolls of hardness up to approximately 68 Shore (C scale), but carbide tools can cut harder rolls up to and including pipe mill rolls that are nearly 80 Shore. A set of these extremely hard rolls recently rolled 3500 miles of pipe between dressings!

Higher turning costs can pay dividends

At these higher-hardness levels, turning a large roll takes time and care; correct speeds must necessarily be selected and feeds are sometimes reduced to only a few thousandths of an inch. And even with a comparatively low rate of metal removal, the cutting tools must be reground after every few hundred surface feet. Three to four tools are worn out on every roll. *But* . . . the dividends in service life pay for the turning costs many times over.

Since Mack-Hemp specializes in rolls, roll turning and large roll contouring lathes, our experience in these three fields together with our awareness of the high tonnages available from the harder roll grades, helps us to make intelligent recommendations to our customers' best advantage. Suggestion: if you have had difficulty in the turning of hard rolls and want to explore their use in your mills, why not give us a call? Address Mackintosh-Hemphill Division, E. W. Bliss Company, 901 Bingham Street, Pittsburgh 3, Pa.



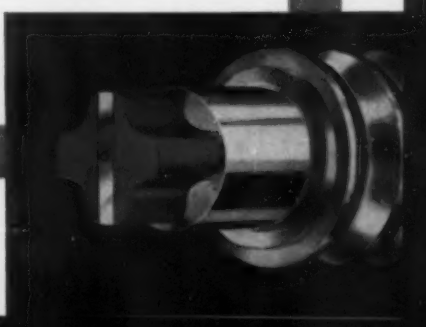
Cutting speeds (approximate) used by Mack-Hemp's machining department. Feeds and depths of cut vary widely depending on the roll and the power of the lathe available. These speeds are offered simply as a guide and should be adjusted to individual requirements.

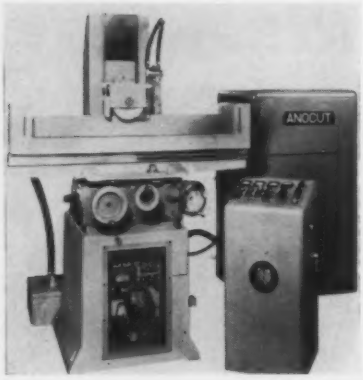
MACKINTOSH-HEMPHILL

You get more tonnage from the rolls with the Striped Red Wabblers

Division of E. W. BLISS COMPANY

Presses, Rolling Mills, Special Machinery

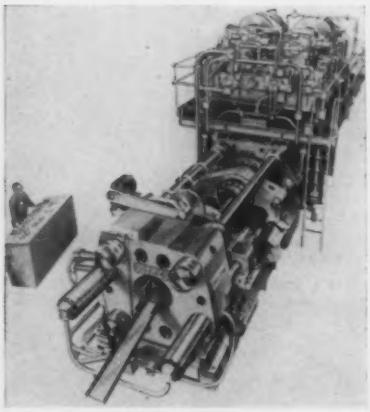




Electrolytic Unit Easily Grinds Carbides

This electrolytic grinder makes short work of stock removal problems involving carbides, hardened steels and heat sensitive materials. In addition, it effectively works pieces that might receive metallurgical damage due to more conventional grinding methods. Still another advantage is its performance of grinding without making burrs. The machine utilizes a basic 300-amp unit as its electrolytic power supply. Aside from the benefits offered by electrolytic grinding in general, this particular unit boasts many features and adaptions for good operation and convenience of control. A special spindle has been designed so that the brushes that apply the direct current through the spindle are enclosed. This eliminates much undesirable dust. (Reid Brothers Co., Inc.)

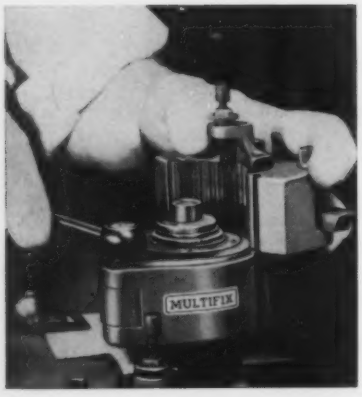
For more data circle No. 44 on postcard, p. 105



Press Extrudes Copper Alloy Rods, Shapes

Especially designed for high-speed extrusion of brass and other copper-alloy rods and shapes, this 1500 to 1870-ton press operates at 90-ipm output. With certain alterations, it'll turn out 120 ipm. Two 350-hp motors drive four Oilgear pumps; two of these are of the DY type. Either or both sets of pumps may be used for operation. Control of the operating cycle reduces time required for operating judgment as the auxiliary motions of the press can be preset and repeated automatically. The setup has a unique material handling feature: Though the press is of the lateral die slide design, it permits extruding with a shell. Handling of the shell is done by a gripper in the die slide and full length container stripping cylinders. (Sutton Engineering Co.)

For more data circle No. 45 on postcard, p. 105



Quick-Clamping Toolholder Cuts Set-up Time

This quick-clamping toolholder can save on set-up time, thus reducing costs. So states its maker. Made in Switzerland, it's said to set-up in one-tenth the time needed with some other holders. The holder lets the set-up man adjust his cutting tool at any desired clearance angle. He easily, quickly fixes the height of the cutting edge with a set screw. The cutting edge may be ground or cleaned without altering adjustment in any way. Changing tools is fast because the holder can be lifted upward without moving the lathe carriage. Tools may be clamped in 40 different positions and successive operations are practically unlimited in number. For mass production jobs, spare tools can be prepared in advance. (G. & D. Sales Co.)

For more data circle No. 46 on postcard, p. 105

Live Center Boasts A 0.00002-in. Accuracy

A new precision live center boasts a guaranteed accuracy to 0.000020-in. for precision turning and grinding. Its extended nose spindle is carbide tipped for maintaining original precision over long periods of operation. Precision preloaded long wheel base bearings are sealed and grease-packed for life-time lubrication. (The Vee-Arc Corp.)

For more data circle No. 47 on postcard, p. 105

LEADERSHIP at work

TF Series mill speeds DC-8 Jetliner toward take-off With G. L. Lyons at the controls, this Kearney & Trecker-Milwaukee Model 650 TF Series mill helps usher in the jet era of air transport. It's shown performing a precision milling operation on a stainless steel wing section for the wind-tunnel model of Douglas Aircraft's new DC-8 Jetliner. The 650 TF machine is just one of 48 models in the only knee-type line in the world with twin elevating screws.

KEARNEY & TRECKER MILWAUKEE

6792 W. NATIONAL AVE., MILWAUKEE 14, WIS.

Kearney & Trecker staff photo by Ron Johnson

K&T's man on the job . . .

D. E. (Tobey) Tobias of Moore Machinery, Los Angeles—helped Douglas in their selection of several TF's. *For expert milling counsel, call the K&T man near you. And remember to ask him, or write direct, for free, comprehensive catalog.*

Carbide Countersinks

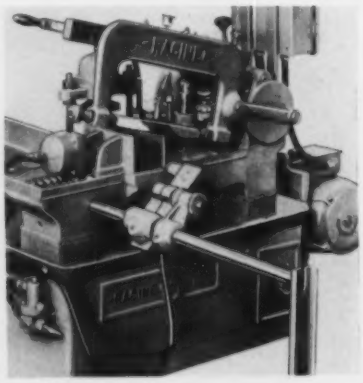
Newly designed, a countersink is a single flute, solid carbide cutter on a steel shank. It has included angles of 60°, 82° or 90°. Three cutter diameters are available: ½, ¾ and 1 in. for each included angle. The countersink sinks holes without chatter or tearing. It produces finishes comparable to a ground surface, its maker says. It's recommended for mild steels and

all materials except hardened steels. Countersinking can be done efficiently at extremely low spindle speeds from 150 to 500 rpm without injury to cutter. (Atrax Co.)

For more data circle No. 48 on postcard, p. 105

Metal Cutter

Automatic stock feed metal cutting machines for cutting ferrous and nonferrous metals now come in two or four-speed models. They have stepped-up cycling time, giving 1-in. pushup per second. Accuracies to 0.005-in. are assured by a microswitch control. The automatic machines will perform: auxiliary service, short run work, over-loads. Or the user can employ them to round out a present line of metal cutting equipment. They cut cold rolled steels, cast iron, high speed steels, hard alloys as well as titanium alloys. Speed changes are made easily. (Racine Hydraulics & Machinery, Inc.)



For more data circle No. 49 on postcard, p. 105

Hacksaw Blades

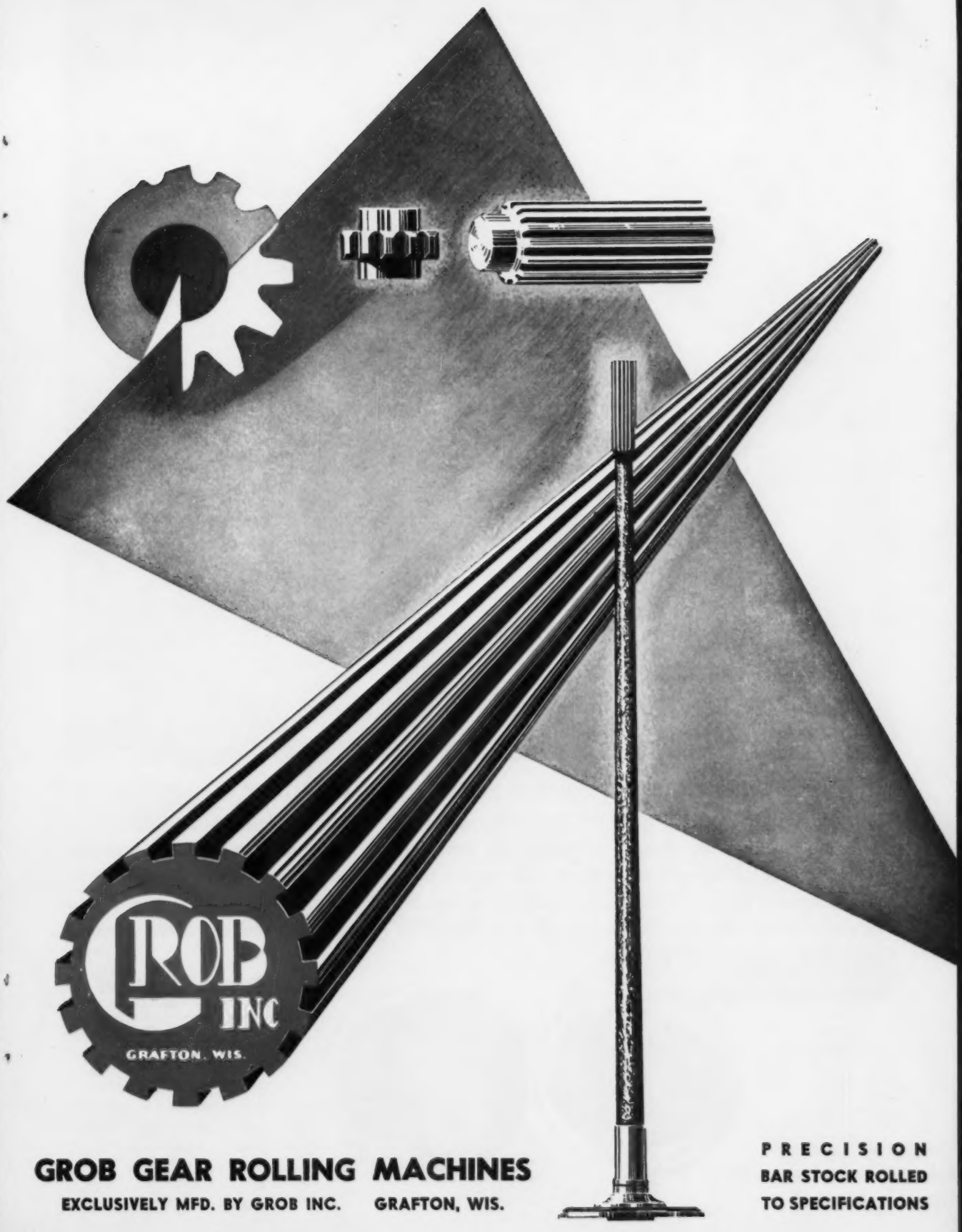
High-speed steel power hacksaw blades just announced have "softbacks." The blades are specially designed so they can be reconditioned at least twice at less than the price of a new blade. This reconditioning not only includes regrinding, but also resetting and rehardening. In fact, even blades with teeth missing can be reconditioned. (R. B. Tool Co., Inc.)

For more data circle No. 50 on postcard, p. 105

Furnace

A new high temperature shaker hearth furnace handles bright carburizing, cyaniding, and hardening

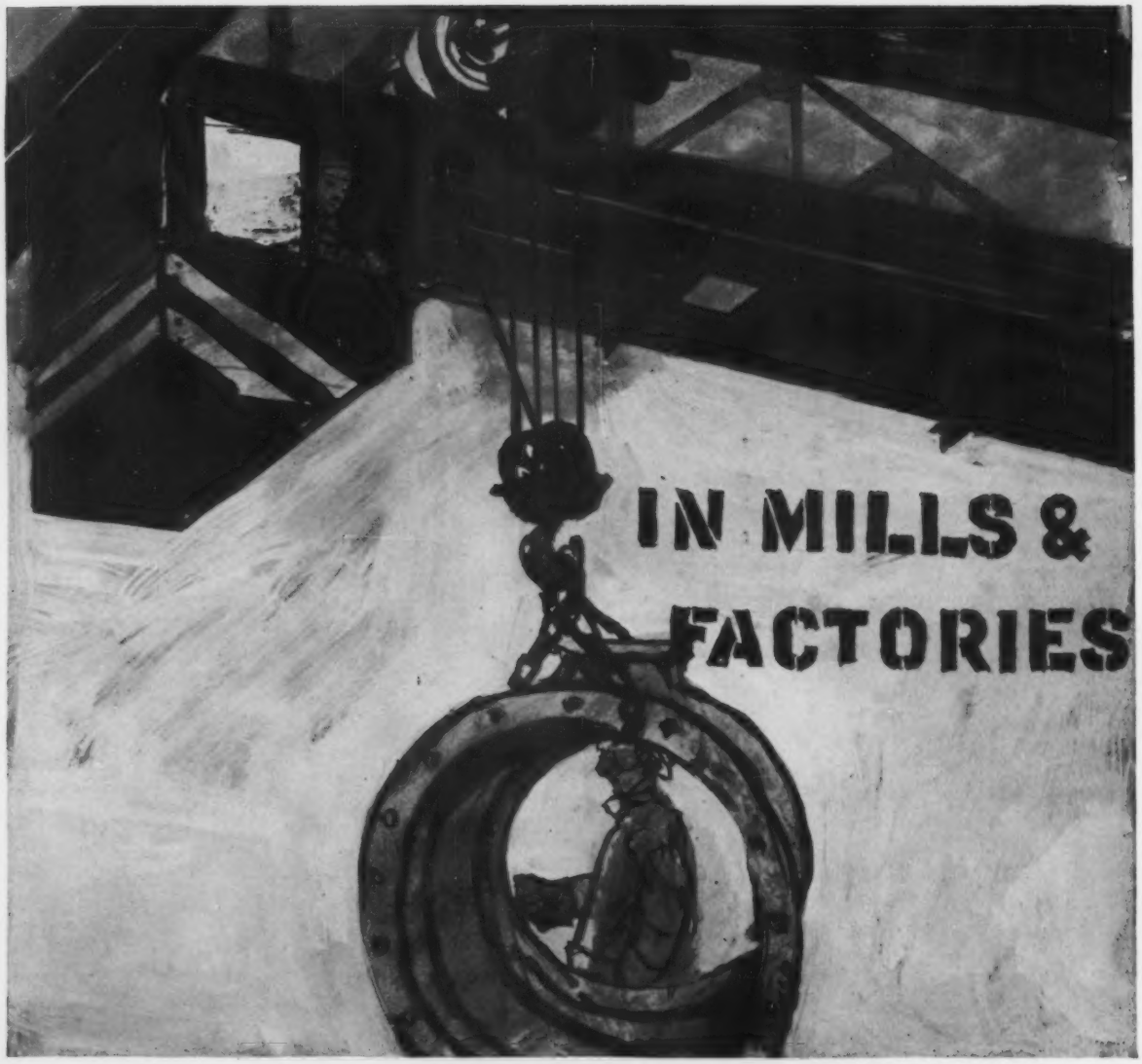
SRH
NEW STAR in the MILLER
GOLD STAR LINE
The revolutionary dc welding performance achieved by the new Miller Gold Star transformer, completely sealed, semimetallic rectifier and weld stabilized circuit is now available in the SRH models. Developed specifically to save room, the SRH is only 30¼" high, offers 200, 300 and 400 ampere machines ideally designed for stacking or paralleling in minimum space.
Complete particulars on the new Miller GOLD STAR SRH will be sent promptly on request.
miller ELECTRIC MANUFACTURING COMPANY, INC.
Distributed in Canada by Canadian Liquid Air Co. Ltd., Montreal
APPLETON, WISCONSIN



GROB GEAR ROLLING MACHINES

EXCLUSIVELY MFD. BY GROB INC. GRAFTON, WIS.

PRECISION
BAR STOCK ROLLED
TO SPECIFICATIONS



NOTHING **TRANSMITS POWER** WITH THE **TENACITY** OF ROEBLING ROYAL BLUE WIRE ROPE. The other reasons why this wire rope gives long, dependable service are equally outstanding. It has exceptional flexibility, shock and abrasion resistance, and high strength beyond the realm of common wire rope usage. Collectively, these qualities give you a wire rope that is a superior value . . . Roebling Royal Blue. For details of the most widely accepted wire rope in Roebling's history, see your local distributor or write to Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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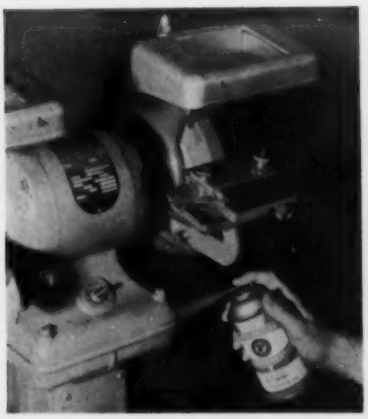
DESIGN
FOR WIRE ROPE
Its ready adaptability is evident wherever power is transmitted. It conforms to unique design requirements. Use wire rope to transmit power.

at temperatures to 1900°F. This furnace is available in three standard sizes with capacities in pounds treated per hour of 15 to 35, 35 to 75, and 75 to 150. It provides automatic conveying of parts through the furnace chamber without the need of reheating a conveyor chain or belt. Parts are heated in a protective atmosphere and dropped directly into a quench; there's no opportunity for oxidation to occur while parts are hot. Multiple zone temperature control provides easily controllable temperatures throughout the heating chamber. (Hevi-Duty Electric Co.)

For more data circle No. 51 on postcard, p. 105

Touch-up Paint

This push-button spray unit helps make easier the retouching of surfaces of industrial power tools. Spray and container weigh 12 oz. The spray is high-quality gray enamel color-blended to match the



finish of both one maker's lines of industrial tools, in particular. It is designed for covering scrapes, nicks, scratches, chips and spots—and for prevention of rust on exposed surfaces. (Delta Power Tool Div., Rockwell Mfg. Co.)

For more data circle No. 52 on postcard, p. 105

Color Code Kit

A new color code kit supplies materials and information necessary to design a successful color coding system. Color coding is used widely in industry—particularly in plants where steel bars, rods, etc. are used in quantity — and wherever identification of crates, boxes, or products "in-process" is desirable. Key item in the kit is a color code chart. In this are spaces which are provided to letter in names of items being identified, along with spaces for the identifying color code. Also supplied is a complete set of gummed tear-off color samples, designed to fit spaces provided. With these materials and detailed instructions, it's but a matter of minutes to design your own color code. (Crown Industrial Products Co.)

For more data circle No. 53 on postcard, p. 105

Press-Scrap Handler

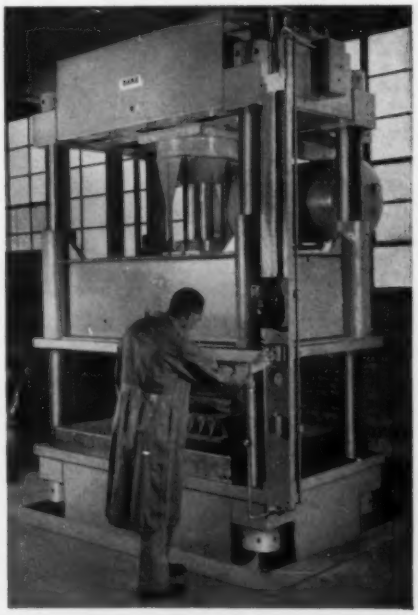
Magnetism is employed by a new unit to hold the metal and power a controlled strike-off via a new

PROBLEM

to produce low-cost prototypes of a new design without the high cost of permanent tooling

SOLUTION

a single 300-ton Dake Hydraulic Die Tryout Press with temporary tooling



Die tryout is a key operation for most die jobbing shops. This is the test that either proves or rejects a die before it is placed in production. But a lack of adequate press facilities is usually the big drawback. A well-known Chicago diemaker, Cripps Engineering and Tool Co., Inc., has effectively solved the problem of die tryout. Although they had a number of production presses, there was a need for greater die tryout capacity. Now with a single 300-ton Dake Hydraulic Press, this diemaker is able to test all dies before delivery to the customer. The result: shop down time is held to a minimum and production efficiency runs smoothly without interruption. Specifications for single-acting and double-acting die tryout presses in eighteen electrically operated models are contained in Bulletin 330. Write today for your copy.

DAKE CORPORATION, 602 Robbins Rd., Grand Haven, Mich.

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CARLSTROM PRESSED METAL CO., INC.

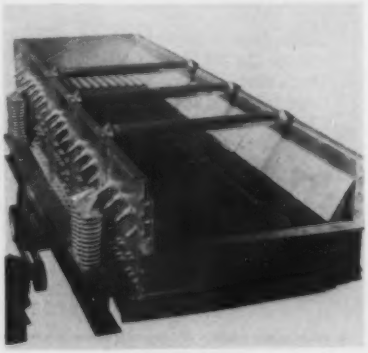
NEW EQUIPMENT

method of scrap control and removal. Developed for stamping and shearing, the device provides fast, positive control and removal of ferrous metal scrap without attention or effort on the part of the press operator. The magnet is mounted in the die. The press closes and the die shears the part. The part falls from the die as press opens. Magnetism holds the scrap out of the way and at the proper instant the powerful kick-off knocks the scrap away from the die into receiving tray. Material is then moved into position for the next operation. Machine Tool Electric Corp.)

For more data circle No. 54 on postcard, p. 105

Vibrating Machines

Vibrating machines of a special design screen and move hot sinter as it comes off the sintering line in steel mills. Decks of the machines, and other members exposed to the abrasive wear of sinter, are made of special metals. Such metals include cast chrome molybdenum, which resist changes in physical characteristics at temperatures ranging from 1000 to 1400°F. High-

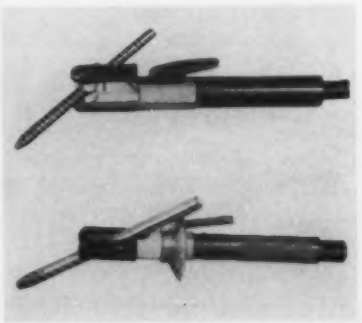


temperature alloys are also employed for critical fasteners, structural and support components. Means are provided for thermal insulation and cooling of the vibrator, the lubricant, and critical structural members. Unique design considerations also provide for the expansion of deck and related sections under the extreme temperatures to which they are directly subjected. (Hewitt-Robins, Inc.)

For more data circle No. 55 on postcard, p. 105

Torches

Two new heavy-duty torch models for metal removal can be used wherever intricate contouring or large volume metal removal is required. Recommended for foundry users confronted with problems of riser stub and flash removal, etc., one torch handles extremely heavy-duty work. Built basically for ¾-in.



electrodes, it's also available in ½- and ⅝-in. sizes. Electrode angle is permanently fixed; ample contact area assures high current capacity. A heat shield protects the operator's hand. Air control is a convenient push-button. The second torch features air jets on both sides of the electrode for increased maneuverability. But it is for heavy-duty service, using ½- and ⅝-in. electrodes only. (The Arcair Co.)

For more data circle No. 56 on postcard, p. 105

Compressor Regulator

For controlling air compressors when they are equipped with suction unloading valves, a new regulator maintains constant pressure on the receiver at all times regardless of load. The regulator connects to an air receiver. Another connection is to suction unloading valves. By varying the opening of the unloading valves the compressor never operates in the "unloaded" condition. It maintains a constant pressure on the receiver regardless of the variations in loads being carried. (Techno Corp.)

For more data circle No. 57 on postcard, p. 105

NEW! from Erie Foundry Co.

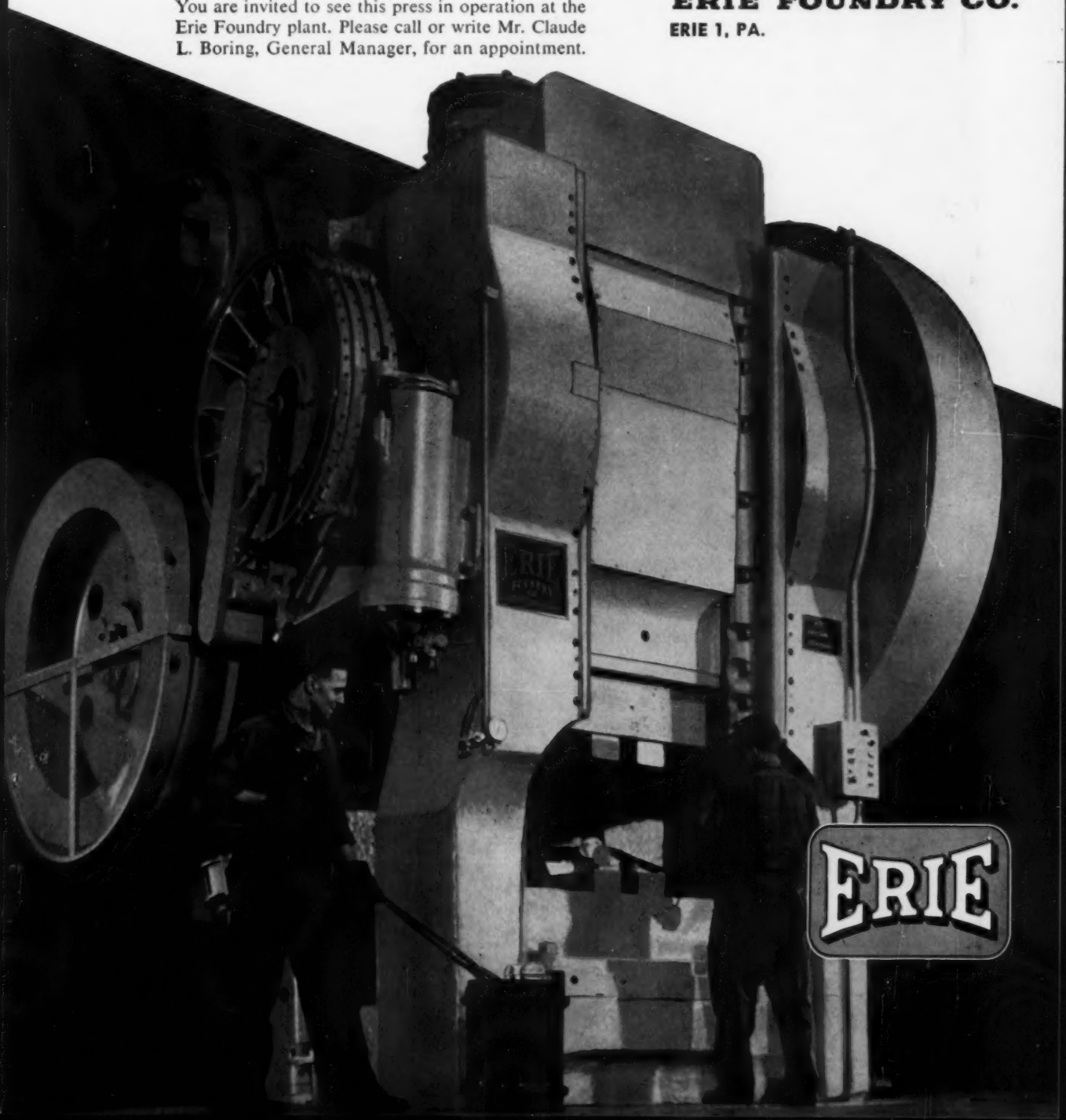
Mechanical Forging Press

By eliminating the conventional pitman, Erie's new mechanical forging press is rugged, more rigid, and more compact. Guiding is unusual, too.

You are invited to see this press in operation at the Erie Foundry plant. Please call or write Mr. Claude L. Boring, General Manager, for an appointment.

Greatest name in forging machinery—Since 1895

ERIE FOUNDRY CO.
ERIE 1, PA.



Let us demonstrate — right in your plant or shop — how 'Budgit' Hoists can make your lifting problems disappear.

Free Demonstration

IN YOUR PLANT OR SHOP

Make us prove how 'Budgit' Hoist can solve YOUR lifting problem

Your local 'Budgit' Electric Hoist distributor now makes you this special offer:

You pick the spot where you need help in lifting.

Call your 'Budgit' Hoist distributor. (You'll find him listed in the yellow pages under 'Budgit'.)

He'll bring a 'Budgit' Hoist to the spot you name, hang it up, plug it in, and show you how 'Budgit' can make your lifting job fast, safe and effortless.

No obligation. Demonstration takes only minutes. All you need is a place to hang the Hoist and an electrical outlet (or 12-volt battery).

HANDLES ANY LOAD

The 'Budgit' Electric Hoist can handle any kind of load up to 2 tons: machinery units, castings, crates, dies, pipe . . . anything. Works indoors or out. Has two automatic brakes for extra safety. Either alone can hold the load.

One-hand control leaves your other hand free to guide the load. Hairline stops and starts let you "spot" your load gently within 1/100th of an inch.

AC and DC models. Also 12-volt battery models for use on trucks. Prices start at $159.

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The Iron Age Summary

Mills Resist Price Pressure

Some steel users are pressuring for price cuts. But they are getting nowhere.

Market bumps along at slow pace, but mills are hopeful of March pickup.

▪ Some steel users are bringing pressure on the mills to cut prices. But they aren't getting anywhere.

The pressure on prices is an old story to steel veterans. They recall the fiasco of the 1930's when depressed business conditions brought about a wave of price-cutting that demoralized the industry.

Mills Warn Salesmen — Some mills are warning their sales forces to expect increasing pressure for price concessions. They are pointing out that established prices and terms of sale still hold—for all customers.

The mills learned a bitter lesson in the 30's. They know from that experience that price cuts failed to bring in any new business, that they were selling the same amount of steel—only at lower prices.

"Built-in" Inflation—The mills' position on prices is understandable. They are faced with "built-in" inflationary factors, including wages, fringes, expansion, selling, and shipping. They have just given their workers a 5-cents-an-hour wage boost and face another wage increase next July 1 under their three-year contract with steel labor. Scrap prices have been on the rise.

The price situation is pretty much the same for the nation's steel warehouses. But there are some isolated instances of price fluctuations in certain areas. For instance, Los Angeles warehouse prices dropped early in December by as much as $35 per ton. But part of this drop —about $15 of it—was restored in recent weeks. The December price cut did not stimulate any new business.

Storm Strengthens Scrap — The storm that struck the eastern part of the country last weekend is expected to strengthen steel scrap prices throughout the East—at least momentarily. Scrap collections in the East are virtually at a standstill. The storm hit at a time when prices were already on the rise.

Meanwhile, there is a growing feeling among steel men that their market has bottomed out. Incoming orders are still slightly lower than the current steel production rate. But the downtrend of the last several months appears to have leveled off. The mills are sill looking for a pickup in March.

Inventories Low — Signs are increasing that steel users' inventories have hit hand-to-mouth levels. A Midwestern appliance maker reportedly is down to about a one-week inventory. Another steel user gave a 30-ton order to a warehouse because his regular mill supplier couldn't give him the prompt delivery he needed.

Steel Output, Operating Rates

Production (Net tons, 000 omitted)	This Week 1,459	Last Week 1,445	Month Ago 1,496	Year Ago 2,484
Ingot Index (1947-1949=100)	90.8	90.0	93.1	154.6
Operating Rates				
Chicago	59.0	58.0*	57.0	95.0
Pittsburgh	58.5	57.0*	57.5	101.0
Philadelphia	63.0	64.0	63.0	105.0
Valley	42.5	41.0*	45.5	98.0
West	76.5	67.5*	62.0	101.0
Buffalo	44.0	46.0	54.0	105.0
Cleveland	31.0	37.0*	45.0	96.0
Detroit	53.0	52.0*	51.0	106.0
S. Ohio River	51.0	44.0*	58.0	90.0
South	49.5	52.0	56.0	95.5
Upper Ohio R.	59.5	58.0*	60.0	104.0
St. Louis	80.0	78.0*	66.0	80.0
Northeast	31.0	31.0	31.0	76.0
Aggregate		53.5	55.4	97.0

*Revised

Prices At a Glance

(cents per lb unless otherwise noted)	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.967	5.967	5.967	5.650
Pig Iron (Gross ton)	$66.49	$66.42	$66.42	$62.90
Scrap, No. 1 hvy (Gross ton)	$37.33	$37.33	$34.33	$53.33
No. 2 bundles	$28.83	$29.17	$26.17	$44.33
Nonferrous				
Aluminum ingot	28.10	28.10	28.10	27.10
Copper, electrolytic	25.00	25.00	25.00	32.00
Lead, St. Louis	12.80	12.80	12.80	15.80
Magnesium ingot	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin Straits, N. Y.	93.625	93.00	91.625	100.50
Zinc, E. St. Louis	10.00	10.00	10.00	13.50

Tool and Die Upsurge Predicted

An improvement in sales is expected this quarter by tool and die manufacturers.

However, even an advance of the forecast 10 to 20 pct would leave industry still below year ago levels.

▪ Tool and die makers are optimistic. They are noticing signs of increased activity in their industry. And because the tool and die business is regarded as a reliable business barometer, the news is encouraging.

Specifically, members of the National Tool and Die Manufacturers Association are predicting an upturn in their industry in the first quarter, perhaps by as much as 10-20 pct over fourth quarter levels in '57. One manufacturer in Detroit even feels a 40-50 pct increase in business in that area is possible.

Increase Would Help—However, even an overall 10-20 pct increase this quarter would still leave the tool and die industry well below year ago activity, according to George S. Eaton, the NTDMA's executive vice president and executive secretary. Pointing out that Detroit and other Michigan tool and die shops were hardest hit by the drop in business in 1957, he says that nationally the last quarter of the year was 25 pct below the same period in 1956.

But an upswing, while still spotty, seems in the making. A Ft. Wayne, Ind., shop says it received more orders in the third week in January than in the preceding six weeks combined.

Auto Orders Due—Detroit shops specializing in large dies report business is picking up as one of the large auto companies has started releasing orders for its 1960 models. Another automaker has indicated orders for 1960 model work will be let in about two months. But these long range programs largely involve big dies and can be handled by only a relatively few shops.

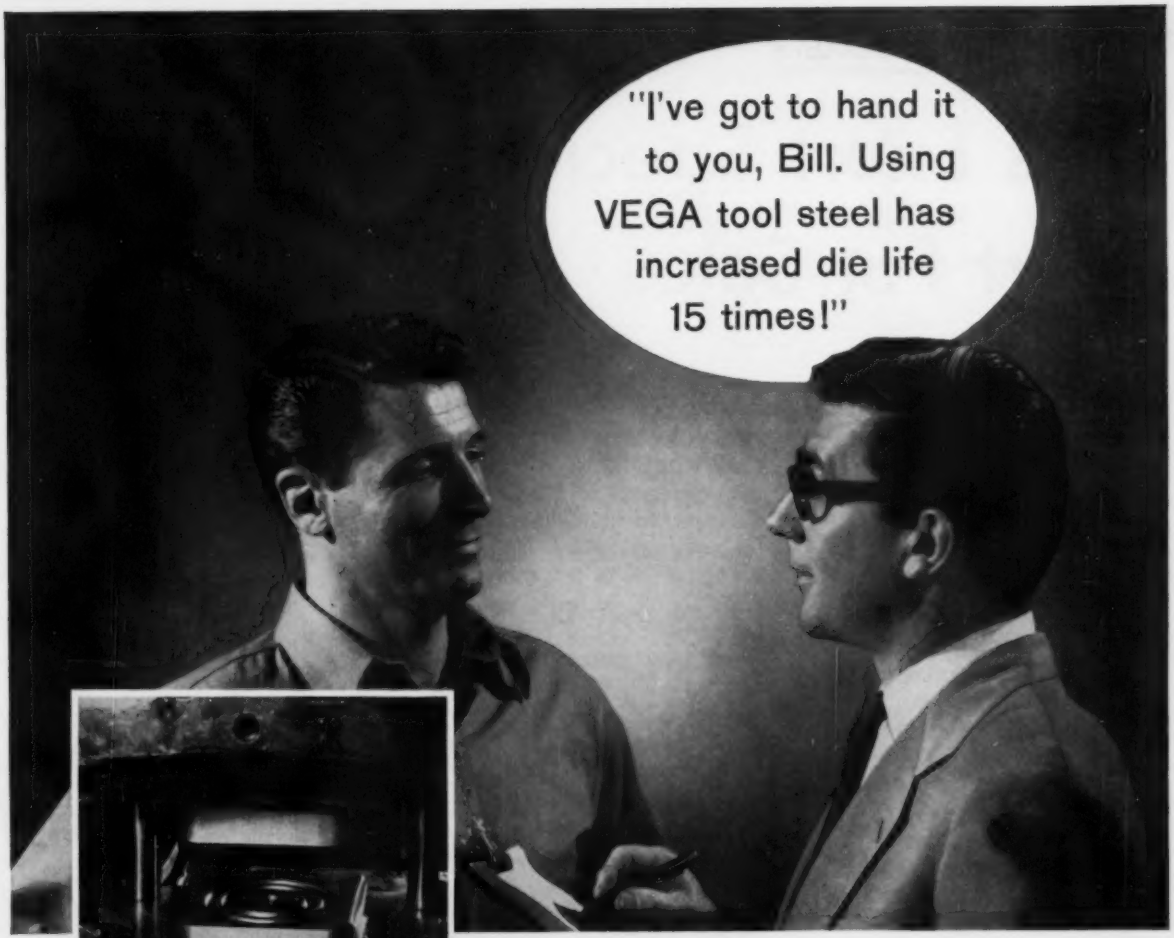
Buyers Shop for Price—Currently there is a lot of shopping-for-price going on, a practice virtually unheard of in past years when shops usually worked at capacity. A Detroit shop says automakers ask quotations from five or six different shops on a job today instead of three as in previous years. A Chicago manufacturer admitted his firm is getting as many as six to eight bids before placing an order.

Price-cutting competition leads one shop owner to comment dryly: "We're all on a hamburger diet. Even if we do get an order, there isn't any profit in it." But small shops are being hurt the most. There are a lot more of them competing against each other."

Detroit Shops Hardest Hit—Areas not so heavily dependent on the auto industry fared better last year than did the one industry shops. The New York, New Jersey and New England shops are in a small product tooling area. Through November of 1957 their volume equalled or exceeded the same period of 1956 for the best showing in the country, according to the last complete NTDMA figures.

On the other hand, Detroit and Michigan saw business dip to 78 pct of 1956 for the first 11 months of last year. Lansing, Mich., was down to 62 pct of 1956 volume.

QUICK DIE CHANGE: Line of presses manufactured by Danly Machine Specialties, Inc., are designed to speed die changes. Second die is maintained outside operating press, ready for installation whenever needed.



Bill's the new toolroom foreman. Just joined the company. And he no sooner got settled than he was tossed a "hot potato".

The production department was using a compound punch and die for stamping parts out of 12- and 13-gauge hot rolled mild steel. The last die — one of many made from an oil-hardening grade — cracked after a run of 10,000 pieces. And the boss was fed up!

Bill moved fast. He called for a rush delivery of VEGA from his nearby Carpenter SERVICE-CENTER. He learned long ago — VEGA's the toughest of all air-hardening tool steels.

After remaking the punch and die it was heat treated to a hardness of Rc-58/60. Then it went on the job. 150,000 pieces went through before the tools were reworked. After annealing, machining and rehardening the tools, another run of 150,000 pieces is expected.

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STEEL PRODUCT MARKETS

Mills Exert Special Effort For Sales

Steel sellers use maximum skill to get business as market limps toward spring.

They're finding faster ways to get orders on the way.

▪ Steel buyers continue enjoying their most favorable market in years as sellers bend over backwards to get their business.

In a market bumping along toward the spring with little pep, steel mills are overlooking few bets to make sales. One Midwest producer, for example, has installed a special telephone system direct from a downtown sales office to the mill. When a salesman gets an inquiry about delivery he calls right to the mill and finds out when the order can be shipped.

Ship, Then Get Order—If a mill knows a sale has been made, it will ship steel even before a formal order has been received. Rush orders requiring immediate shipment are not always greeted with loud cheers at the mill level. With reduced rolling schedules and employee furloughs it's often a rough struggle getting them processed.

Bookings continue arriving late in the month, adding to scheduling difficulties. Customer independence makes ordering a last-second proposition. Salesmen, with a few requests for April tonnage already received, are still scurrying around looking for February business.

With most steel products in the doldrums the recent improvement in merchant wire items (see below) has been one encouraging sign in a very slow winter.

Wire Products—Seasonal spurts in ordering are pepping up the merchant wire products market. While most merchant items are showing the improvement welded wire fabric for construction use is especially strong. Even in the wire market, however, the current emphasis on last minute buying and inventory filling is prominent. Imports are a continuing headache with an **Eastern** producer maintaining the market there for barbed wire is virtually all foreign-sold. Importers are also bagging about 40 pct of the nail orders in the area.

Manufacturers wire market is slow, largely because of the depressed level of buying by auto companies and automotive parts suppliers.

Sheet and Strip—Customers are not specifying product more than a few weeks in advance. As a result mill delivery promises of 2-3 weeks are needed in order to get orders. Appliance industry inventories are regarded as particularly low but no upsurge in orders is coming from that market area. One appliance manufacturer is said to be holding to a six-day receiving and shipping inventory. Estimating three days for inplant processing of the delivered steel, it leaves only about a three-day inventory. **Eastern** mills are looking for orders to fill out the balance of February. **Midwestern** producers expect a further drop in sheet in March.

Pig Iron—With demand continuing at very low levels some sources believe pig will show no real strength during most of '58. A **Midwestern** supplier indicates sales are about 50 to 55 pct below those of the same period last year. There's no evidence of a pickup, either. In the **East,** the market is so competitive that supplies of foundry and malleable pig iron are being barged into the Philadelphia area from an Everett, Mass., basing point. They are being priced to meet product shipped from closer producing points.

Freight increases effective Saturday, Feb. 15, have raised The IRON AGE Pig Iron Composite by 7¢ to a current listing of $66.49 per gross ton. The advance came when delivered pig iron prices at Philadelphia rose as a result of the freight boost.

Plate—Deliveries are very short with mills looking for orders to fill in rolling schedules. An **Eastern** producer has only about 10 days rolling time booked so far in March and is still seeking late February tonnage. Plate customers in the **Midwest** are reducing inventories and a market decline is expected to continue.

Structurals—Some improvement in the market is hoped for when the spring construction season gets under way. At present deliveries are rapid and customers are keeping watch on inventories. Some mill operations are at a fair level in the **Midwest,** about 19 turns a week, but with no backlogs as a cushion it's expected operations will fall soon.

Bar—Most product is on 1 to 3 week delivery and few mills have full rolling schedules. Cold finished bar is described as particularly slow in the **Midwest.**

PURCHASING AGENT'S CHECKLIST

Freight car sales are heading downhill. **P. 46**

Problem of avoiding inventory runout is now getting serious consideration. **P. 48**

COMPARISON OF PRICES

(Effective Feb. 18, 1958)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in **Heavy Type**; declines appear in *Italics*.

	Feb. 18 1958	Feb. 11 1958	Jan. 21 1958	Feb. 19 1957
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.925¢	4.925¢	4.925¢	4.675¢
Cold-rolled sheets	6.05	6.05	6.05	5.75
Galvanized sheets (10 ga.)	6.60	6.60	6.60	6.30
Hot-rolled strip	4.925	4.925	4.925	4.675
Cold rolled strip	7.17	7.17	7.17	6.870
Plate	5.12	5.12	5.12	4.87
Plates, wrought iron	13.15	13.15	13.15	10.40
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	50.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.30	$10.30	$10.30	$9.95
Tin plates, electro (0.50 lb.)	9.00	9.00	9.00	8.65
Special coated mfg. ternes	9.55	9.55	9.55	9.20
Bars and Shapes: (per pound)				
Merchant bar	5.425¢	5.425¢	5.425¢	5.075¢
Cold finished bars	7.30	7.30	7.30	6.85
Alloy bars	6.475	6.475	6.475	6.125
Structural shapes	5.275	5.275	5.275	5.00
Stainless bars (No. 302)	45.00	45.00	45.00	43.25
Wrought iron bars	14.45	14.45	14.45	11.50
Wire: (per pound)				
Bright wire	7.65¢	7.65¢	7.65¢	7.20¢
Rails: (per 100 lb.)				
Heavy rails	$5.525	$5.525	$5.525	$5.075
Light rails	6.50	6.50	6.50	6.00
Semifinished Steel: (per net ton)				
Rerolling billets	$77.50	$77.50	$77.50	$74.00
Slabs, rerolling	77.50	77.50	77.50	74.00
Forging billets	96.00	96.00	96.00	91.50
Alloy blooms, billets, slabs	114.00	114.00	114.00	107.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.15¢	6.15¢	6.15¢	5.80¢
Skelp	4.875	4.875	4.875	4.225
Finished Steel Composite: (per pound)				
Base price	5.967¢	5.967¢	5.967¢	5.650¢

	Feb. 18 1958	Feb. 11 1958	Jan. 21 1958	Feb. 19 1957
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.97	$70.51	$70.51	$66.88
Foundry, Valley	66.50	66.50	66.50	63.00
Foundry, Southern Cin'ti	73.87	71.65	71.65	67.17
Foundry, Birmingham	62.50	62.50	62.50	59.00
Foundry, Chicago	66.50	66.50	66.50	63.00
Basic, del'd Philadelphia	70.47	70.01	70.01	66.38
Basic, Valley furnace	66.00	66.00	66.00	62.50
Malleable, Chicago	66.50	66.50	66.50	63.00
Malleable, Valley	66.50	66.50	66.50	63.00
Ferromanganese, 74-76 pct Mn, cents per lb‡	12.25	12.25	12.25	12.75
Pig Iron Composite: (per gross ton)				
Pig iron	$66.49	$66.42	$66.42	$62.90
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$36.50	$36.50	$32.50	$53.50
No. 1 steel, Phila. area	38.00	38.00	38.00	57.50
No. 1 steel, Chicago	37.50	37.50	32.50	49.00
No. 1 bundles, Detroit	29.50	29.50	22.50	45.50
Low phos., Youngstown	38.50	38.50	35.50	53.50
No. 1 mach'y cast, Pittsburgh	49.50	49.50	49.50	56.50
No. 1 mach'y cast, Phila.	47.50	47.50	47.50	57.50
No. 1 mach'y cast, Chicago	49.50	49.50	47.50	50.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$37.33	$37.33	$34.33	$53.33
No. 2 bundles	28.83	29.17	26.17	44.33
Coke Connellsville: (per net ton at oven)				
Furnace coke, prompt	$15.38	$15.38	$15.38	$15.38
Foundry coke, prompt	$17.50-$19	$17.50-$19	$17.50-$19	$17.50-19
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	25.00	25.00	25.00	32.00
Copper, Lake, Conn.	25.00	25.00	25.00	32.00
Tin, Straits, N. Y.	98.625†	93.00	91.625	100.50
Zinc, East St. Louis	10.00	10.00	10.00	13.50
Lead, St. Louis	12.80	12.80	12.80	15.80
Aluminum, virgin ingot	28.10	28.10	28.10	27.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	33.00	33.00	33.00

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Averages of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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Has Market Reached Stalling Point?

Little strength has materialized at the mills to keep recent uptrend going.

Frigid weather is also a factor in keeping market activity at a minimum.

▪ The market has paused in its two-months-long upturn and doubt over whether it will be resumed shortly is growing.

A few more signs of weakness are appearing here and there. The few price changes that occurred this week were generally on the downside.

Steelmaking grades failed to move, for the most part. Exceptions were drops in New York and in No. 2 grades in Chicago, which remained firm otherwise.

Market inactivity stemmed from apathy within the market and extremely adverse weather. Heavy snowstorms and zero weather over most of the eastern half of the country kept activity at a minimum.

Pittsburgh — Prices of most grades are unchanged as trading is almost at a standstill. Cold weather, mill-disinterest, and dealer resistance have cut scrap movement to an occasional small shipment. One mill has paid $35 for a small quantity of No. 1 heavy melting. Dealers are reportedly unwilling to sell tonnages of the same grade for less than $39. Cupola cast and heavy breakable are up $1 on the basis of small purchases.

Chicago — Prices moved off on scattered grades, though the market in general is firm. Broker buying prices slipped, and at least three mills made purchases at somewhat more conservative prices. Part of the weakening in offering prices is based on a downward revision of mill operating forecasts for March. Scrap continues to move out of the area, however, and supplies in yards continue very low. No. 1 factory bundles were incorrectly quoted in Feb. 13 issue. Correct price was $42 to $43.

Philadelphia — The scrap industry is snowbound here. Shipments are at a standstill. Yard workers moved more snow in the last few days than they have scrap in the past winter. What material they manage to pry loose will probably go to the docks for export. There are no price changes.

Detroit—Cast grades are getting a little play in this market for the first time in quite a while. Several Michigan and Ohio foundries offer support, but part of the buying is speculative. Many auto plants are expected to fall considerably short of their scrap generation estimates made for February lists. Prices of mixed borings and turnings and shoveling turnings were transposed in the Feb. 13 issue. Correct prices were mixed borings and turnings, $11 to $12; shoveling turnings $12 to $13.

Cleveland—The market is in a continued stalemate with dealers selling off only tonnage necessary to meet expenses, and with mills not too interested. Some brokers are paying overmarket prices to cover spot tonnage on old orders. Local foundries are slow, but out-of-town demand is fair and some foundry scrap is moving on up to $5 freight.

St. Louis — Little interest is shown in either buying or selling, with prices generally unchanged as a result. Below zero weather has halted collection and processing. Cast grades are in better demand, with cupola cast up $1. Standard steel car axles and unstripped motor blocks are $2 higher.

New York—After some ups and downs, openhearth grades have stabilized at a price $1 under last week's quotations. Reason for the fluctuation was failure of a higher market in an adjacent consuming area to materialize. The recent snowfall is expected to raise prices as scrap movement is at a virtual standstill.

Birmingham—No. 2 heavy melting is growing short in supply, although other grades continue plentiful. The trade is generally optimistic. The theory is that mills have been out of the market so long, when they do come in it will result in higher prices.

Cincinnati — A foundry strike starting this week held up shipments in an already weak foundry market. The strike may be prolonged in the entire Miami Valley area since a new contract is involved and foundries are not anxious to settle.

Buffalo — Prices remain unchanged in an inactive market. Price rises in other areas are not affecting prices here. Very little volume is moving into yards.

Boston — Most of the trade closed up shop early this week because of Boston's worst 24-hour storm in history. Scrap movement is paralyzed.

West Coast—Dealers are trying to hold back scrap, figuring on higher prices. But the mills are just taking minimum amounts at current price levels. Export looks sick for the next few months.

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SCRAP PRICES *(Effective Feb. 18, 1958)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	36.00 to 37.00
No. 1 factory bundles	38.00 to 39.00
No. 2 bundles	30.00 to 31.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	17.00 to 18.00
Mixed bor. and ms. turn.	17.00 to 18.00
Shoveling turnings	21.00 to 22.00
Cast iron borings	21.00 to 22.00
Low phos. punch'gs plate	39.00 to 40.00
Heavy turnings	35.00 to 36.00
No. 1 RR hvy melting	41.00 to 42.00
Scrap rails, random lgth.	50.00 to 51.00
Rails 2 ft and under	55.00 to 56.00
RR steel wheels	48.00 to 49.00
RR spring steel	48.00 to 49.00
RR couplers and knuckles	48.00 to 49.00
No. 1 machinery cast.	49.00 to 50.00
Cupola cast.	40.00 to 41.00
Heavy breakable cast.	38.00 to 39.00

Chicago

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	38.00 to 39.00
No. 1 factory bundles	41.00 to 42.00
No. 2 bundles	28.00 to 29.00
No. 1 busheling	37.00 to 38.00
Machine shop turn.	21.00 to 22.00
Mixed bor. and turn.	23.00 to 24.00
Shoveling turnings	24.00 to 25.00
Cast iron borings	23.00 to 24.00
Low phos. forge crops	51.00 to 52.00
Low phos. punch'gs plate	46.00 to 48.00
Low phos. 3 ft and under	44.00 to 45.00
No. 1 RR hvy. melting	41.00 to 42.00
Scrap rails, random lgth.	50.00 to 51.00
Rerolling rails	56.00 to 57.00
Rails 2 ft and under	58.00 to 59.00
Locomotive tires cut	50.00 to 51.00
Cut bolsters & side frames	47.00 to 48.00
Angles and splice bars	51.00 to 52.00
RR steel car axles	55.00 to 56.00
RR couplers and knuckles	37.00 to 38.00
No. 1 machinery cast.	49.00 to 50.00
Cupola cast.	42.00 to 43.00
Heavy breakable cast.	40.00 to 41.00
Cast iron brake shoe	40.00 to 41.00
Cast iron wheels	37.00 to 38.00
Malleable	53.00 to 54.00
Stove plate	40.00 to 41.00
Steel car wheels	50.00 to 51.00

Philadelphia Area

No. 1 hvy. melting	$37.50 to $38.50
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	37.50 to 38.50
No. 2 bundles	27.00 to 28.00
No. 1 busheling	37.50 to 38.50
Machine shop turn.	20.00 to 21.00
Mixed bor. short turn.	21.00 to 22.00
Cast iron borings	22.00 to 23.00
Shoveling turnings	22.00 to 23.00
Clean cast. chem. borings	30.00 to 31.00
Low phos. 5 ft and under	42.00 to 43.00
Low phos. 2 ft and under	43.00 to 44.00
Low phos. punch'gs	43.00 to 44.00
Elec. furnace bundles	39.00 to 40.00
Heavy turnings	33.00 to 34.00
RR steel wheels	45.00 to 46.00
RR spring steel	45.00 to 46.00
Rails 18 in. and under	58.00 to 60.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	39.00 to 40.00
Cast iron car wheels	40.00 to 41.00
Malleable	57.00 to 58.00
Unstripped motor blocks	32.00 to 33.00
No. 1 machinery cast.	47.00 to 48.00

Cleveland

No. 1 hvy. melting	$33.50 to $34.50
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	33.50 to 34.50
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	23.00 to 24.00
No. 1 bushelings	33.50 to 34.50
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Cut struct'r'l & plates, 2 ft & under	39.00 to 40.00
Drop forge flashings	33.50 to 34.50
Low phos. punch'gs, plate	34.50 to 35.50
Foundry steel, 2 ft & under	36.00 to 37.00
No. 1 RR heavy melting	42.00 to 43.00
Rails 2 ft and under	56.00 to 57.00
Rails 18 in. and under	57.00 to 58.00
Railroad grate bars	17.00 to 18.00
Steel axle turnings	18.00 to 19.00
Railroad cast.	49.00 to 50.00
No. 1 machinery cast.	47.00 to 48.00
Stove plate	45.00 to 46.00
Malleable	61.00 to 62.00

Youngstown

No. 1 hvy. melting	$37.50 to $38.50
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	37.50 to 38.50
No. 2 bundles	26.00 to 27.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos. plate	38.00 to 39.00

Buffalo

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	25.50 to 26.50
No. 1 busheling	28.00 to 29.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	22.50 to 23.50
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	14.00 to 15.00
Low phos. plate	34.00 to 35.00
Scrap rails, random lgth.	40.00 to 41.00
Rails 2 ft and under	50.00 to 51.00
RR steel wheels	37.00 to 38.00
RR spring steel	33.00 to 34.00
RR couplers and knucklers	33.00 to 34.00
No. 1 machinery cast.	45.00 to 46.00
No. 1 cupola cast.	40.00 to 41.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	28.00 to 29.00
Drop forge flashings	26.00 to 27.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	11.00 to 12.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	11.00 to 12.00
Low phos. punch'gs plate	28.00 to 29.00
No. 1 cupola cast.	34.00 to 35.00
Heavy breakable cast.	27.00 to 28.00
Stove plate	27.00 to 28.00
Automotive cast.	36.00 to 37.00

St. Louis

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	17.00 to 18.00
Cast iron borings	18.00 to 19.00
Shoveling turnings	20.00 to 21.00
No. 1 RR hvy. melting	37.00 to 38.00
Rails, random lengths	47.00 to 48.00
Rails, 18 in. and under	55.00 to 56.00
Angles and splice bars	47.00 to 48.00
Std. steel car axles	47.00 to 48.00
RR specialties	44.00 to 45.00
Cupola cast.	45.00 to 46.00
Heavy breakable cast.	32.00 to 33.00
Cast iron brake shoes	37.00 to 38.00
Stove plate	38.00 to 39.00
Cast iron car wheels	37.00 to 38.00
Rerolling rails	54.00 to 55.00
Unstripped motor blocks	35.00 to 36.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	27.00 to 28.00
No. 2 bundles	17.50 to 18.50
No. 1 busheling	24.00 to 25.00
Elec. furnace, 3 ft & under	31.00 to 32.00
Machine shop turn.	9.50 to 10.50
Mixed bor. and short turn.	9.50 to 10.50
Shoveling turnings	11.00 to 12.00
Clean cast. chem. borings	16.00 to 17.00
No. 1 machinery cast.	32.00 to 33.00
Mixed cupola cast.	28.00 to 29.00
Heavy breakable cast.	27.00 to 28.00
Stove plate	26.00 to 27.00
Unstripped motor blocks	26.00 to 27.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	29.00 to 30.00
No. 2 dealer bundles	24.00 to 25.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	15.00 to 16.00
Clean cast. chem. borings	23.00 to 24.00
No. 1 machinery cast.	34.00 to 35.00
Mixed yard cast.	32.00 to 33.00
Charging box cast.	30.00 to 31.00
Heavy breakable cast.	30.00 to 31.00
Unstripped motor blocks	27.00 to 28.00

Birmingham

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	23.00 to 24.00
Shoveling turnings	24.00 to 25.00
Cast iron borings	12.00 to 13.00
Electric furnace bundles	36.00 to 37.00
Elec. furnace, 3 ft & under	34.00 to 35.00
Bar crops and plate	39.00 to 40.00
Structural and plate, 2 ft	39.00 to 40.00
No. 1 RR hvy. melting	36.00 to 37.00
Scrap rails, random lgth.	43.00 to 44.00
Rails, 18 in. and under	49.00 to 50.00
Angles & splice bars	42.00 to 43.00
Rerolling rails	45.00 to 46.00
No. 1 cupola cast.	50.00 to 51.00
Stove plate	49.00 to 50.00
Charging box cast.	22.00 to 23.00
Cast iron car wheels	38.00 to 39.00
Unstripped motor blocks	40.00 to 41.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.50 to 25.50
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	15.00 to 16.00
Low phos, 18 in. and under	38.00 to 39.00
Rails, random length	44.00 to 45.00
Rails, 18 in. and under	54.00 to 55.00
No. 1 cupola cast.	38.00 to 39.00
Hvy. breakable cast.	33.00 to 34.00
Drop broken cast.	47.00 to 48.00

San Francisco

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	28.00
No. 2 bundles	22.00
Machine shop turn	15.00
Cast iron borings	15.00
No. 1 RR hvy. melting	32.00
No. 1 cupola cast.	40.00

Los Angeles

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	32.00
No. 1 dealer bundles	30.00
No. 2 bundles	22.00
Machine shop turn.	$9.00 to 11.00
Shoveling turnings	11.00 to 13.00
Cast iron borings	11.00 to 13.00
Elec. furn. 1 ft and under (foundry)	45.00
No. 1 RR hvy. melting	34.00
No. 1 cupola cast	38.00

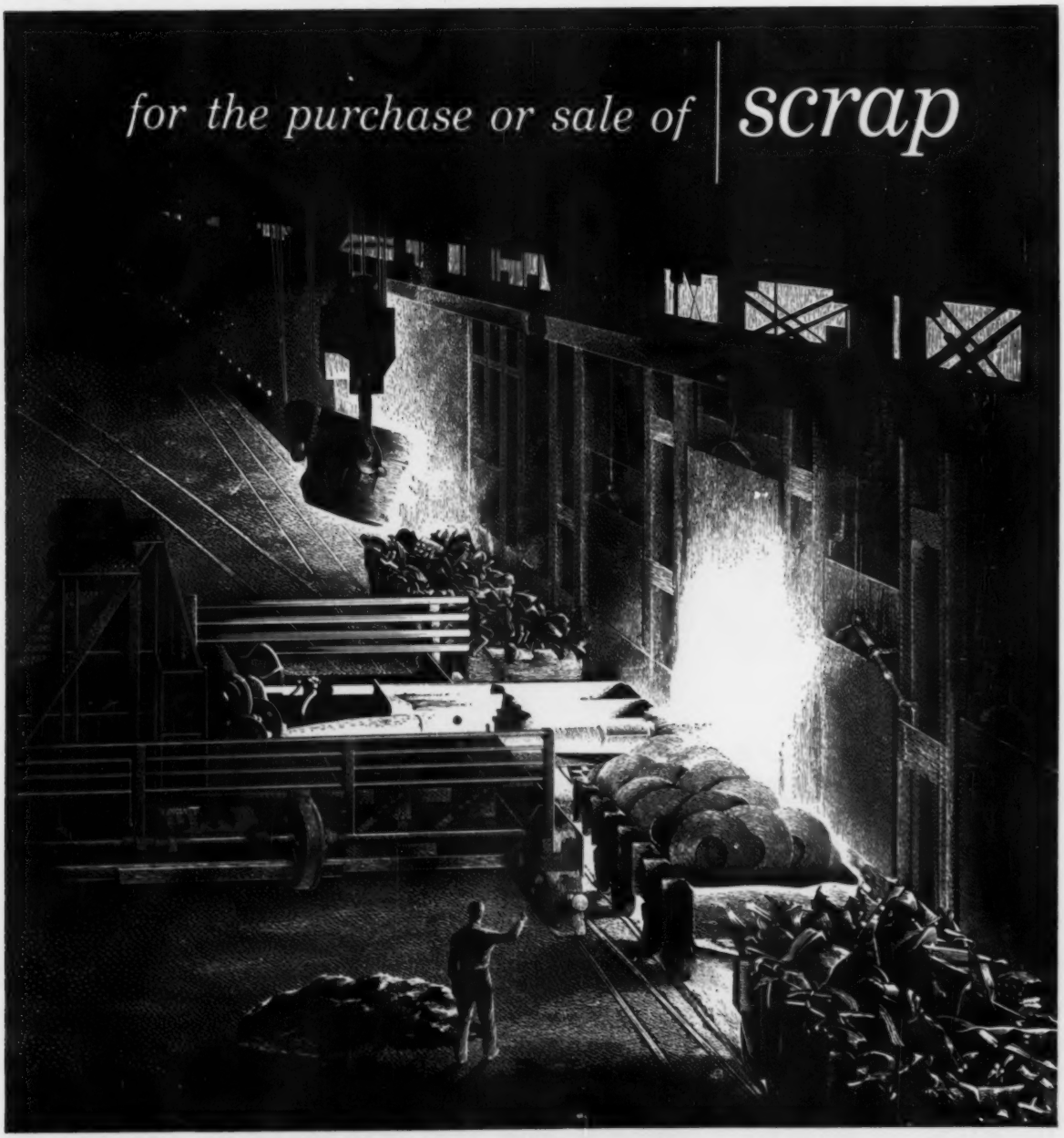
Seattle

No. 1 hvy. melting	$30.00
No. 2 hvy. melting	28.00
No. 2 bundles	22.00
No. 1 cupola cast.	36.00
Mixed yard cast.	36.00

Hamilton, Ont.

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	27.00
No. 1 dealer bundles	32.00
No. 2 bundles	24.00
Mixed steel scrap	27.00
Busheling	22.00
Bush., new fact, prep'd	32.00
Bush., new fact, unprep'd	26.00
Machine shop turn.	17.00
Short steel turn.	21.00
Mixed bor. and turn.	17.00
Rails, rerolling	41.00
Cast scrap	$44.00 to 47.00

for the purchase or sale of | *scrap*



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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Copper Shipments Surprise Trade

Copper Institute says shipments to fabricators in January were up sharply.

Trade is surprised as markets are still very soft.

Some optimists believe turn may indicate inventory cutting is at an end.

■ There were a lot of raised eyebrows over The Copper Institute report on industry activity in January. The major surprise was shipments to fabricators.

The Copper Institute reports shipments to fabricators rebounded solidly from the poor December showing. Yet the industry's biggest customers, brass and wire mills, report that if there was any shift in their business in January it was down slightly. Markets remain very soft with the U. S. producers' price as much as 4¢ below some foreign suppliers.

Shipments to fabricators:
In U. S.
Jan. 1958—109,707
Dec. 1957— 84,446
Outside U. S.
Jan. 1958—150,171
Dec. 1957—133,901
(net tons)

Reports on brass and bronze ingot shipments from the Defense Council of the brass and bronze industry show the same apparent trend:

Jan. 1958—20,468
Dec. 1957—16,468
(net tons)

When the trade recovered from its surprise two possible explanations were offered for the apparent disagreement.

Most of the sellers point to the fact that domestic copper shipments in December hit a yearly low. And shipments of brass and bronze ingots lacked only a few pounds of hitting the yearly bottom.

Averages Provide Answers—The answer is carryovers from December, they say. To get a true picture you have to average shipments in December and January. For domestic copper shipments this would be about 97,076 tons, down slightly from the previous months.

For brass and bronze ingots the average of December and January would be 18,671 tons, also down slightly from November and December.

A few optimists cross their fingers and say this turn in deliveries may signal the end of inventory cutting. For most of the last half of 1957, they point out, copper deliveries were not indicative of consumption because most customers were operating at least partly out of inventory. Most of the copper bought at the height of the market is probably used up, they add. This would mean hand-to-mouth buying with consumption of copper about equalling shipments.

Bigger Refinery—Kennecott Copper Co. has expanded its new copper refinery project at Baltimore. Original plans called for a 7000 ton annual capacity at a construction cost of $20 million. New planned capacity is 16,500 tons at a cost of $30 million.

Tungsten

It appears the domestic tungsten mining industry has lost the final battle for government support.

The House of Representatives Appropriations Committee in cutting the Interior Dept.'s proposed budget said, "The committee sees absolutely no justification for additional expenditure of federal funds for this purpose and directs that no additional tungsten contracts be approved."

Much of the domestic industry works lower grade ores than foreign operations and says it needs government support to be competitive.

Barter

The program of swapping surplus U. S. farm products for foreign strategic minerals and metals rolls on despite restrictive regulations. But it is in low gear.

Despite the fact that a contractor must prove to the satisfaction of the Commodity Credit Corp. that his transaction does not replace a cash transaction, contracts valued at $5.2 million were negotiated in the last quarter of 1957.

This is off sharply from the $83 million worth of contracts signed in last quarter 1956.

Tin prices for the week: Feb. 12—Holiday; Feb. 13—93.125; Feb. 14—93.25; Feb. 17—93.125; Feb. 18—93.625.*

* Estimate

Primary Prices

(cents per lb)	Current price	last price	date of change
Aluminum pig	26.00	25.00	8/1/57
Aluminum ingot	28.10	27.10	8/1/57
Copper (E)	25.00	27.00	1/13/58
Copper (CS)	24.00	24.50	1/21/57
Copper (L)	25.00	27.00	1/13/58
Lead, St. L.	12.80	13.30	12/2/57
Lead, N. Y.	13.00	13.50	12/2/57
Magnesium ingot	36.00	34.00	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/6/58
Titanium sponge	200-250	165-250	1/29/58
Zinc, E. St. L.	10.00	10.50	7/1/57
Zinc, N. Y.	10.50	11.00	7/1/57

ALUMINUM: 99% ingot frt allwd. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig, Velasco, Tex. NICKEL: Port Colbourne, Canada. ZINC: prime western. TIN: see above; other primary prices, pg. 136.

ELECTRI-LIVING HOME • COURTESY LIVING FOR YOUNG HOMEMAKERS

Get BRASS you can "build on"... personally planned to your special needs

Solid Brass is a firm foundation for a good product-reputation in any field of marketing.

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Since 1850, makers of Brass strip, rod and wire in
BRISTOL, CONNECTICUT

solid brass

Bristol Brass has offices and warehouses in Boston, Buffalo, Chicago, Cleveland, Dayton, Detroit, Milwaukee, New York, Philadelphia, Pittsburgh, Rochester, Syracuse.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136-.249	.250-3.
1100, 3003	46.6	44.3	43.6	42.7
5052	54.0	48.9	47.2	45.4
6061-0	51.4	47.0	45.2	45.1

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6-8	45.0-46.8	60.4-64.1
12-14	45.7-47.2	61.3-65.8
24-26	49.0-49.5	72.1-76.8
36-38	58.0-58.6	96.2-99.8

Screw Machine Stock—2011-T-3

Size"	¼	⅜-⅝	¾-1	1¼-1½
Price	63.0	62.5	61.0	58.6

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.420	$1.893	$2.367	$2.839
.024 gage	1.774	2.366	2.957	3.549

MAGNESIUM

(F.o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	....	67.9	69.0	77.9	108.1
AZ31B Spec.	.....	93.3	95.7	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	69.6	70.7	75.6	89.2
Spec. Grade.. (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	126	106	128
Strip, CR	124	105	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	120	105	121
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	48.13	.....	45.36	48.32
Brass, 70/30	42.69	43.23	42.63	45.60
Brass, Low	44.90	45.44	44.84	47.71
Brass, R L	45.67	46.21	45.61	48.48
Brass, Naval	47.07	.....	41.38	50.48
Munts Metal	45.19	.....	41.00	.....
Comm. Bz.	46.98	47.52	46.92	49.54
Mang. Bz.	50.81	.....	44.91	.....
Phos. Bz. 5%	67.17	.....	67.67	.....

Free Cutting Brass Rod 31.03

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, $9.50-$10.60; alloy, $14.75; Plate, HR, commercially pure, $8.00-$8.75; alloy, $10.75. Wire, rolled and/or drawn, commercially pure, $7.50-$8.00; alloy, $10.00. Bar, HR or forged, commercially pure, $6.15-$6.40; alloy, $6.15-$6.35; billets, HR, commercially pure, $6.00-$6.25; alloy, $6.00-$6.20.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium aluminum 5% Be, Dollar per lb contained Be $74.75
Beryllium copper, per lb conta'd Be .$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots .....$ 2.25
Cadmium, del'd .....$ 1.55
Calcium, 99.9%, small lots .....$ 4.55
Chromium, 99.8% metallic basis ...$ 1.31
Cobalt, 97-99% (per lb) ..$2.00 to $2.07
Germanium, per gm, f.o.b. Miami, Okla., refined .....39.50 to 51.00
Gold, U. S. Treas, per troy oz. $35.00
Indium, 99.9%, dollars per troy oz...$ 2.25
Iridium, dollars per troy oz.....$80 to $90
Lithium, 98% .....$11.00 to $14.00
Magnesium, sticks, 100 to 500 lb.... 59.00
Mercury, dollars per 76-lb flask, f.o.b. New York .....$220 to $225
Nickel oxide sinter at Copper Cliff, Ont., contained nickel 71.25
Palladium, dollars per troy oz...$19 to $21
Platinum, dollars per troy oz...$77 to $80
Rhodium .....$120.00 to $125.00
Silver ingots (¢ per troy oz.).....88.625
Thorium, per kg. $43.00
Vanadium .....$ 3.45
Zirconium sponge .....$ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 ..... 25.75
No. 120 ..... 24.75
No. 123 ..... 24.00
80-10-10 ingot
No. 305 ..... 29.75
No. 315 ..... 27.75
88-10-2 ingot
No. 210 ..... 36.75
No. 215 ..... 32.50
No. 245 ..... 29.25
Yellow ingot
No. 405 ..... 21.25
Manganese bronze
No. 421 ..... 23.00

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 24.75-25.75
0.60 copper max. 24.50-25.50
Piston alloys (No. 122 type)..23.75-24.50
No. 12 alum. (No. 2 grade) ...21.00-21.75
108 alloy 21.25-22.25
195 alloy 24.00-25.50
13 alloy (0.60 copper max.) ..24.75-25.75
AXS-679 .....21.25-22.25

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97½% 22.00-23.00
Grade 2—92-95% 21.00-21.75
Grade 3—90-92% 20.00-20.75
Grade 4—85-90% 17.50-18.50

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	21	20¼
Yellow brass	16⅛	14½
Red brass	18⅝	17⅞
Comm. bronze	19¼	18½
Mang. bronze	14⅞	14⅛
Yellow brass rod ends	15⅞	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 19
No. 2 copper wire 17½
Light copper 15¼
*Refinery brass 17
Copper bearing material 16½
*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 19
No. 2 copper wire 17½
Light copper 15¼
No. 1 composition..... 17¼—17½
No. 1 comp. turnings..... 16¾—17
Hvy. yellow brass solids .... 12¼—12½
Brass pipe 14
Radiators 13¾
Aluminum
Mixed old cast. ..... 12½—13½
Mixed new clips ..... 14½—15½
Mixed turnings, dry ..... 13 —14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 17 —17½
No. 2 copper wire ..... 15 —15½
Light copper ..... 13 —13½
Auto radiators (unsweated).. 11 —11½
No. 1 composition ..... 14½—15
No. 1 composition turnings.. 13½—14
Cocks and faucets ..... 11½—12
Clean heavy yellow brass ... 11 —11½
Brass pipe ..... 12 —12½
New soft brass clippings .... 12½—13
No. 1 brass rod turnings .... 10 —10½

Aluminum

Alum. pistons and struts .... 5½— 6
Aluminum crankcases ..... 10 —10½
1100 (2S) aluminum clippings 13 —13½
Old sheet and utensils ..... 10 —10½
Borings and turnings ..... 6½— 7
Industrial castings ..... 10 —10½
2024 (24S) clippings ..... 11½—12

Zinc

New zinc clippings ..... 4 — 4½
Old zinc ..... 3 — 3¼
Zinc routings ..... 1¾— 2
Old die cast scrap ..... 1½— 1¾

Nickel and Monel

Pure nickel clippings 42-45
Clean nickel turnings 37-40
Nickel anodes 42-45
Nickel rod ends 42-45
New Monel clippings 28-29
Clean Monel turnings 20-23
Old sheet Monel 25-26
Nickel silver clippings, mixed. 18
Nickel silver turnings, mixed. 15

Lead

Soft scrap lead ..... 8½— 9
Battery plates (dry) ..... 3½— 3¾
Batteries, acid free ..... 2½— 2¾

Miscellaneous

Block tin ..... 75 —76
No. 1 pewter ..... 59 —60
Auto babbitt ..... 39 —40
Mixed common babbitt ..... 11 —11½
Solder joints ..... 14½—15
Siphon tops 42
Small foundry type ..... 12 —12¼
Monotype ..... 12 —12½
Lino. and stereotype ..... 11 —11¼
Electrotype ..... 10 —10¼
Hand picked type shells .... 7 — 7½
Lino. and stereo. dross ..... 3 — 3¼
Electro dross ..... 2½— 2¾

(Effective Feb. 17, 1958)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$114.00 *B3*		5.325 *B3*	7.80 *B3*	5.325 *B3*						
	Buffalo, N. Y.	$77.50 *R3, B3*	$96.00 *R3, B3*	$114.00 *R3, B3*	6.225 *B3*	5.325 *B3*	7.80 *B3*	5.325 *B3*	4.925 *R3, B3*	7.15 *S10*	7.325 *B3*			
	Phila., Pa.									7.70 *P15*				
	Harrison, N. J.													15.05 *C11*
	Conshohocken Pa.		$101.00 *A2*	$121.00 *A2*					4.975 *A2*	7.20 *A2*	7.325 *A2*			
	New Bedford, Mass.									7.60 *R6*				
	Johnstown, Pa.	$77.50 *B3*	$96.00 *B3*	$114.00 *B3*		5.325 *B3*	7.80 *B3*							
	Boston, Mass.									7.70 *T8*				15.40 *T8*
	New Haven, Conn.									7.60 *D1*				
	Baltimore, Md.									7.15 *T8*				
	Phoenixville, Pa.					5.325 *P2*		5.325 *P2*						
	Sparrows Pt., Md.								4.925 *B3*		7.325 *B3*			
	Bridgeport, Wallingford, Conn.			$114.00 *N8*						7.60 *W1*				
	Pawtucket, R. I. Worcester, Mass.									7.70 *N7* 7.70 *A5*				15.40 *N7* 15.20 *T8*
MIDDLE WEST	Alton, Ill.								5.125 *L1*					
	Ashland, Ky.								4.925 *A7*					
	Canton-Massillon, Dover, Ohio		$96.00 *R3*	$114.00 *R3, T5*						7.15 *G4*		10.45 *G4*		14.85 *C11*
	Chicago, Ill. Franklin Park, Ill. Evanston, Ill.	$77.50 *U1, R3*	$96.00 *U1, R3,W8*	$114.00 *U1, R3,W8*	6.225 *U1*	5.275 *U1, W8,P13*	7.75 *U1,Y1* *W8*	5.275 *U1*	4.925 *W8, N4,A1*	7.25 *A1,T8* *M8*			8.10 *W8, S9,I3*	15.05 *A1, S9,G4*
	Cleveland, Ohio									7.15 *A5,J3*		10.45 *A5*	8.10 *J3*	
	Detroit, Mich.			$114.00 *R5*					5.025 *G3, M2*	7.25 *M2,D1, D2,G3,P11*	7.425 *G3*	10.60 *D2* 10.55 *G3*	8.10 *G3*	
	Anderson, Ind.									7.15 *G4*				
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$77.50 *U1*	$96.00 *U1*	$114.00 *U1, Y1*		5.275 *U1, I3*	7.75 *U1, I3*	5.275 *I3*	4.925 *U1, I3,Y1*	7.15 *Y1*	7.325 *U1, I3,Y1*	10.60 *Y1*	8.10 *U1, Y1*	
	Sterling, Ill.	$77.50 *N4*				5.275 *N4*			5.025 *N4*					
	Indianapolis, Ind.									7.30 *J3*				15.20 *J3*
	Newport, Ky.												8.10 *A9*	
	Middletown, Ohio													
	Niles, Warren, Ohio Sharon, Pa.		$96.00 *S1, C10*	$114.00 *C10,S1*					4.925 *R3, S1*	7.15 *R3,T4* *S1*	7.325 *R3, S1*	10.50 *S1* 10.45 *R3*	8.10 *S1*	15.05 *S1*
	Owensboro, Ky.	$77.50 *G5*	$96.00 *G5*	$114.00 *G5*										
	Pittsburgh, Pa. Midland, Pa. Butler, Pa. Aliquippa, Pa.	$77.50 *U1, P6*	$96.00 *U1, C11,P6*	$114.00 *U1, C11,B7*	6.225 *U1*	5.275 *U1, J3*	7.75 *U1, J3*	5.275 *U1*	4.925 *P6*	7.15 *J3,B4, S7*			8.10 *S9*	15.05 *S9*
	Weirton, Wheeling, Follansbee, W. Va.				6.225 *W3*	5.275 *W3*			4.925 *W3*	7.15 *W3,F3*	7.325 *W3*	10.50 *W3*		
	Youngstown, Ohio	$77.50 *R3*	$96.00 *Y1, C10*	$114.00 *Y1*			7.75 *Y1*			7.15 *Y1,J3*	7.325 *U1, Y1*	10.65 *Y1*	8.10 *U1, Y1*	15.05 *J3* 10.65 *Y1*
WEST	Fontana, Cal.	$88.00 *K1*	$105.50 *K1*	$135.00 *K1*		6.075 *K1*	8.55 *K1*	6.225 *K1*	5.675 *K1*	9.00 *K1*				
	Geneva Utah		$96.00 *C7*			5.275 *C7*	7.75 *C7*							
	Kansas City, Mo.					5.375 *S2*	7.85 *S2*						8.35 *S2*	
	Los Angeles, Torrance, Cal.		$105.50 *B2*	$134.00 *B2*		5.975 *C7, B2*	8.45 *B2*		5.675 *C7, B2*	9.05 *J3*			9.30 *B2*	17.25 *J3*
	Minnequa, Colo.					5.575 *C6*			5.825 *C8*	9.10 *K1*				
	Portland, Ore.					6.025 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$105.50 *B2*			5.925 *B2*	8.40 *B2*		5.675 *C7, B2*					
	Seattle, Wash.		$109.50 *B2*			6.025 *B2*	8.50 *B2*		5.925 *B2*					
SOUTH	Atlanta, Ga.					5.475 *A8*			5.125 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$77.50 *T2*	$96.00 *T2*			5.275 *T2, R1,C16*	7.75 *T2*		4.925 *T2, R3,C16*		7.325 *T2*			
	Houston, Lone Star, Texas		$101.00 *S2*	$119.00 *S2*		5.375 *S2*	7.85 *S2*						8.35 *S2*	

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STEEL PRICES

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		SHEETS								WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Holloware Enameling 29 ga.
EAST	Bethlehem, Pa.												
	Buffalo, N. Y.	4.925 *B3*	6.05 *B3*				7.275 *B3*	8.975 *B3*		6.15 *W6*	† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	4.975 *A2*	6.10 *A2*				7.325 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.15 *B3*			
	Fairless, Pa.	4.975 *U1*	6.10 *U1*				7.325 *U1*	9.025 *U1*			$10.15 *U1*	$8.85 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	4.925 *B3*	6.05 *B3*	6.60 *B3*			7.275 *B3*	8.975 *B3*	9.725 *B3*	6.25 *B3*	$10.15 *B3*	$8.85 *B3*	
	Worcester, Mass.									6.45 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.35 *L1*			
	Ashland, Ky	4.925 *A7*		6.60 *A7*	6.625 *A7*								
	Canton-Massillon, Dover, Ohio			6.60 *R3, R1*									
	Chicago, Joliet, Ill.	4.925 *W8, A1*					7.275 *U1*			6.15 *A5, R3, W8, N4, K2*			
	Sterling, Ill.									6.25 *N4, K2*			
	Cleveland, Ohio	4.925 *R3, J3*	6.05 *R3, J3*		6.625 *R3*		7.275 *R3, J3*	8.975 *R3, J3*		6.15 *A5*			
	Detroit, Mich.	5.025 *G3, M2*	6.15 *G3* 6.05 *M2*				7.375 *G3*	9.075 *G3*					
	Newport, Ky	4.925 *A1*	6.05 *A1*										
	Gary, Ind. Harbor, Indiana	4.925 *U1, I3, Y1*	6.05 *U1, I3, Y1*	6.60 *U1, I3*	6.625 *U1, I3, Y1*	7.00 *U1*	7.275 *U1, Y1, I3*	8.975 *U1, Y1*		6.15 *Y1*	$10.05 *U1, Y1*	$8.75 *I3, U1, Y1*	7.50 *U1, Y1*
	Granite City, Ill.	5.125 *G2*	6.25 *G2*	6.80 *G2*	6.825 *G2*							$8.85 *G2*	7.60 *G2*
	Kokomo, Ind.			6.70 *C9*						6.25 *C9*			
	Mansfield, Ohio		6.05 *E2*			7.00 *E2*							
	Middletown, Ohio		6.05 *A7*	6.60 *A7*	6.625 *A7*	7.00 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	4.925 *R3, N3, S1*	6.05 *R3*	6.60 *R3*	6.625 *N3, S1*	7.00 *N3, S1, R3*	7.275 *R3*	8.975 *S1, R3*				$8.75 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa. Donora, Pa. Aliquippa, Pa.	4.925 *U1, J3, P6*	6.05 *U1, J3, P6*	6.60 *U1, J3*	6.625 *U1*		7.275 *U1, J3*	8.975 *U1, J3*	9.725 *U1*	6.15 *A5, J3, P6*	$10.05 *U1, J3*	$8.75 *U1, J3*	7.50 *U1, J3*
	Portsmouth, Ohio	4.925 *P7*	6.05 *P7*							6.15 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.925 *W3, W5*	6.05 *W3, F3, W5*	6.60 *W3, W5*		7.00 *W3, W5*	7.275 *W3*	8.975 *W3*			$10.05 *W5, W3*	$8.75 *W5, W3*	7.50 *W5*
	Youngstown, Ohio	4.925 *U1, Y1*	6.05 *Y1*		6.625 *Y1*		7.275 *Y1*	8.975 *Y1*		6.15 *Y1*			
WEST	Fontana Cal.	5.675 *K1*	7.30 *K1*				8.025 *K1*	10.275 *K1*			$10.80 *K1*	$9.50 *K1*	
	Geneva, Utah	5.025 *C7*											
	Kansas City, Mo.									6.40 *S2*			
	Los Angeles, Torrance, Cal.									6.95 *B2*			
	Minnequa, Colo.									6.40 *C6*			
	San Francisco, Niles, Pittsburgh, Cal.	5.625 *C7*	7.00 *C7*	7.35 *C7*						6.95 *C7*	$10.80 *C7*	$9.50 *C7*	
	Seattle, Wash.												
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	4.925 *T2, R3*	6.05 *T2, R3*	6.60 *T2, R3*						6.15 *T2, R3*	$10.15 *T2*	$8.85 *T2*	
	Houston, Tex.									6.40 *S2*			

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		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfrs'. Bright
EAST	Bethlehem, Pa.				6.475 *B3*	8.775 *B3*	7.925 *B3*					
	Buffalo, N. Y.	5.425 *R3,B3*	5.425 *R3,B3*	7.35 *B5*	6.475 *B3,R3*	8.775 *B3,B5*	7.925 *B3*	5.10 *B3*		7.20 *B3*		7.65 *W6*
	Claymont, Del.							5.10 *C4*		7.20 *C4*	7.625 *C4*	
	Coatesville, Pa.							5.10 *L4*		7.20 *L4*	7.925 *L4*	
	Conshohocken, Pa.							5.20 *A2*	6.175 *A2*	7.20 *A2*	7.625 *A2*	
	Harrisburg, Pa.							5.10 *P2*	6.275 *P2*			
	Milton, Pa.	5.575 *M7*	5.575 *M7*									
	Hartford, Conn.			7.80 *R3*		9.075 *R3*	7.925 *B3*					
	Johnstown, Pa.	5.425 *B3*	5.425 *B3*		6.475 *B3*			5.10 *B3*		7.20 *B3*	7.625 *B3*	7.65 *B3*
	Fairless, Pa.	5.575 *U1*	5.575 *U1*		6.625 *U1*							
	Newark, N. J. Camden, N. J.			7.75 *W10* 7.75 *P10*		8.95 *W10* 8.95 *P10*						
	Bridgeport, Conn. Putnam, Conn. Willimantic, Conn.			7.85 *W10* 7.80 *J3*	6.55 *N8*	8.925 *N8*						
	Sparrows Pt., Md.		5.425 *B3*					5.10 *B3*		7.20 *B3*	7.625 *B3*	7.75 *B3*
	Palmer, Worcester, Readville, Mass. Mansfield, Mass.			7.85 *B5,C14*		9.075 *A5,B5*						7.95 *A5, W6*
	Spring City, Pa.			7.75 *K4*		8.95 *K4*						
MIDDLE WEST	Alton, Ill.	5.625 *L1*										7.85 *L1*
	Ashland,Newport,Ky.							5.10 *A7,A1*		7.20 *A1*		
	Canton, Massillon, Ohio			7.30 *R3,R2*	6.475 *R3,T5*	8.775 *R3,R2, T5*						
	Chicago, Joliet, Waukegan, Ill. Harvey, Ill.	5.425 *U1,R3, W8,N4,P13*	5.425 *U1,R3, N4,P13*	7.30 *A5, W10,W8 B5,L2,N9*	6.475 *U1,R3, W8*	8.775 *A5, W10,W8 L2,N8,B5*	7.925 *U1,W8*	5.10 *U1,A1, W8,13*	6.175 *U1*	7.20 *U1,W8*	7.625 *U1,W8*	7.65 *A5,R3, W8,N4, K2,W7*
	Cleveland, Ohio Elyria, Ohio	5.425 *R3*	5.425 *R3*	7.30 *A5,C13 C18*		8.775 *A5, C13, C18*	7.925 *R3*	5.20 *R3,J3*	6.175 *J3*		7.625 *R3, J3*	7.65 *A5, C13*
	Detroit, Mich.	5.525 *G3*	5.775 *G3*	7.55 *P3* 7.50 *P8,B5*	6.475 *R5* 6.575 *G3*	8.775 *R5* 8.975 *B5,P3, P8*	8.025 *G3*	5.20 *G3*		7.35 *G3*		
	Duluth, Minn.											7.65 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.425 *U1,I3, Y1*	5.425 *U1,I3, Y1*	7.30 *R3,J3*	6.475 *U1,I3, Y1*	8.775 *R3,M4*	7.925 *U1, Y1*	5.10 *U1,I3, Y1*	6.175 *J3,I3*	7.20 *U1,Y1*	7.625 *U1, Y1,I3*	7.75 *M4*
	Granite City, Ill.							5.30 *G2*				
	Kokomo, Ind											7.75 *C9*
	Sterling, Ill.	5.525 *N4*	5.525 *N4*					5.10 *N4*				7.75 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.30 *C10*	6.475 *C10,S1*	8.775 *C10*	7.925 *S1*	5.10 *R3,S1*		7.20 *S1*	7.625 *R3, S1*	
	Owensboro, Ky.	5.425 *G5*			6.475 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.425 *U1,J3*	5.425 *U1,J3*	7.30 *A5,B4, R3,J3,C11, W10,S9,C8*	6.475 *U1,J3, C11,B7*	8.775 *A5, W10,R3,S9, C11,C8*	7.925 *U1,J3*	5.10 *U1,J3*	6.175 *U1*	7.20 *U1,J3, B7*	7.625 *U1,J3, B7*	7.65 *A5, J3,P6*
	Portsmouth, Ohio											7.65 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.10 *W5*				
	Youngstown, Ohio	5.425 *U1,R3, Y1*	5.425 *U1,R3, Y1*	7.30 *A5,Y1, F2*	6.475 *U1,Y1*	8.775 *Y1,F2*	7.925 *U1,Y1*	5.10 *U1,R3, Y1*		7.20 *Y1*	7.625 *U1, R3,Y1*	7.65 *Y1*
WEST	Emeryville, Cal. Fontana, Cal.	6.175 *J5* 6.125 *K1*	6.175 *J5* 6.125 *K1*		7.525 *K1*		8.625 *K1*	5.90 *K1*		8.00 *K1*	8.425 *K1*	
	Geneva, Utah							5.10 *C7*			7.625 *C7*	
	Kansas City, Mo.	5.675 *S2*	5.675 *S2*		6.725 *S2*		8.175 *S2*					7.90 *S2*
	Los Angeles, Torrance, Cal.	6.125 *C7,B2*	6.125 *C7,B2*	8.75 *R3,P14*	7.525 *B2*	10.65 *P14*	8.625 *B2*					8.60 *B2*
	Minnequa, Colo.	5.875 *C6*	5.875 *C6*					5.95 *C6*				7.90 *C6*
	Portland, Ore.	6.175 *O2*	6.175 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.125 *C7* 6.175 *B2*	6.125 *C7* 6.175 *B2*				8.675 *B2*					8.60 *C7,C6*
	Seattle Wash.	6.175 *B2,N6*	6.175 *B2*				8.675 *B2*	6.00 *B2*		8.10 *B2*	8.525 *B2*	
SOUTH	Atlanta, Ga.	5.625 *A8*	5.625 *A8*									7.85 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	5.425 *T2,R3, C16*	5.425 *T2,R3, C16*	7.90 *C16*			7.925 *T2*	5.10 *T2,R3*			7.625 *T2*	7.65 *T2,R3*
	Houston, Ft. Worth, Lone Star, Tex.	5.675 *S2*	5.675 *S2*		6.725 *S2*		8.175 *S2*	5.20 *S2* 5.20 *L3*		7.30 *S2*	7.725 *S2*	7.90 *S2*

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STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Dearborn Div., Sharon Steel Corp.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owensboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 J. & L. Steel Co., Stainless Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
STANDARD T. & C.	**Blk.**	**Gal.**	**Blk.**	**Gal.**	**Blk.**	**Gal.**	**Blk.**	**Gal.**	**Blk.**	**Gal.**	**Blk.**	**Gal.**	**Blk.**	**Gal.**	**Blk.**	**Gal.**	**Blk.**	**Gal.**	**Blk.**	**Gal.**	**Blk.**	**Gal.**
Sparrows Pt. *B3*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Youngstown *R3*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Fontana *K1*	+8.25	+23.5	+5.25	+19.5	+1.75	+15.00	0.75	+14.25	1.25	+13.25	1.75	+12.75	3.25	+13.00								
Pittsburgh *J3*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Alton, Ill. *L1*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Sharon *M3*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Fairless *N2*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Pittsburgh *N1*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Wheeling *W5*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Wheatland *W4*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Youngstown *Y1*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Indiana Harbor *Y1*	4.25	+11.0	7.25	+7.0	10.75	+2.50	13.25	+1.75	13.25	+0.75	14.25	+0.25	15.75	+1.00								
Lorain *N2*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Youngstown *R3*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Fairless *N2*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Fontana *K1*	+3.75		0.25		3.25		3.75		4.25		4.75		5.25									
Pittsburgh *J3*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Alton, Ill. *L1*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Sharon *M3*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Pittsburgh *N1*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Wheeling *W5*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Wheatland *W4*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Youngstown *Y1*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Indiana Harbor *Y1*	8.75	+5.0	12.75	+1.0	15.75	3.50	16.25	2.25	16.75	3.25	17.25	3.75	17.75	2.50								
Lorain *N2*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50

Threads only, buttweld and seamless 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 10¢ per lb.

(Effective Feb. 17, 1958)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.795	T-1
18	4	1	—	5	2.50	T-4
18	4	2	—	—	1.96	T-2
1.5	4	1.5	8	—	1.155	M-1
6	4	3	6	—	1.545	M-3
6	4	2	5	—	1.30	M-2
High-carbon chromium					.925	D-3, D-5
Oil hardened manganese					.475	O-2
Special carbon					.36	W-1
Extra carbon					.36	W-1
Regular carbon					.305	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*A3, J2, L4, C4*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	37.95	42.25	46.70	40.00
	316	44.40	49.50	54.50	58.75
	321	40.05	44.60	49.30	47.25
	347	42.40	47.55	52.80	57.00
	405	29.85	33.35	36.85	.....
	410	29.55	33.10	36.70	.....
	430	29.80	33.55	37.25	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 40.25; 1 side, 33.95.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.525	6.50	6.975	.....	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	.....	14.75
So. Chicago *R3*	.....	.....	.....	9.75	.....	.....	.....
Ensley *T2*	5.525	6.50	.....	.....	.....	.....	.....
Fairfield *T2*	.....	6.50	.....	9.75	.....	6.60	.....
Gary *U1*	5.525	.....	.....	.....	.....	6.60	.....
Huntington *C16*	.....	6.50	.....	.....	.....	.....	.....
Ind. Harbor *I3*	5.525	.....	6.975	9.75	.....	6.60	.....
Ind. Harbor *Y1*	.....	.....	.....	9.75	.....	.....	.....
Johnstown *B3*	.....	6.50	.....	.....	.....	.....	.....
Joliet *U1*	.....	.....	6.975	.....	.....	.....	.....
Kansas City *S2*	.....	.....	.....	9.75	.....	.....	14.75
Lackawanna *B3*	5.525	6.50	6.975	.....	.....	6.60	.....
Lebanon *B3*	.....	.....	6.975	.....	14.50	.....	14.75
Minnequa *C6*	5.525	7.00	6.975	9.75	.....	6.60	14.75
Pittsburgh *P5*	.....	.....	.....	.....	.....	.....	14.75
Pittsburgh *J3*	.....	.....	.....	9.75	.....	.....	.....
Seattle *B2*	.....	.....	.....	10.25	.....	6.75	15.75
Steelton *B3*	5.525	.....	6.975	.....	.....	6.60	.....
Struthers *Y1*	.....	.....	.....	9.75	.....	.....	.....
Torrance *C7*	.....	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.50	.....	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	9.75	.....	.....	.....

COKE

Furnace, beehive (f.o.b.) Connellsville, Pa.	Net-Ton $15.00 to $15.75
Foundry, beehive (f.o.b.)	$17.50 to $19.00
Foundry oven coke	
Buffalo, del'd	$31.75
Detroit, f.o.b.	30.50
New England, del'd	31.55
Kearney, N. J., f.o.b.	29.75
Philadelphia, f.o.b.	29.50
Swedeland, Pa., f.o.b.	29.50
Painesville, Ohio, f.o.b.	30.50
Erie, Pa., f.o.b.	30.50
Cleveland, del'd	32.65
Cincinnati, del'd	31.84
St. Paul, f.o.b.	29.75
St. Louis, f.o.b.	31.50
Birmingham, f.o.b.	28.85
Milwaukee, f.o.b.	30.50
Neville, Is., Pa.	29.25

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1957 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field		9.625	.....
Armature	11.10	10.85	11.35
Elect.	11.80	11.55	12.05
Special Motor		12.10	.....
Motor	12.90	12.65	13.15
Dynamo	13.95	13.70	14.20
Trans. 72	15.00	14.75	15.25
Trans. 65	15.55		
		Grain Oriented	
Trans. 58	16.05	Trans. 66	20.20
Trans. 52	17.10	Trans. 80	19.20
		Trans. 73	19.70

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	26.00	40	100, 110	10.70
20	72	25.25	35	110	10.70
18	72	25.75	30	110	10.85
14	72	25.75	24	72 to 84	11.25
12	72	26.25	20	90	11.00
10	60	28.00	17	72	11.40
10	48	28.50	14	72	11.85
7	60	28.25	12	60	12.95
6	60	31.50	10	60	13.00
4	40	35.00	8	60	13.30
3	40	37.00			
2½	30	39.25			
2	24	60.75			

* Prices shown cover carbon nipples.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.00)	$135.00
No. 1 Ohio	120.00
Sec. Quality, Pa., Md., Ky., Mo., Ill.	120.00
No. 2 Ohio	103.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $2.00)	21.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$150.00
Childs, Hays, Pa.	155.00
Chicago District	160.00
Western Utah	175.00
California	180.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	157.00-160.00
Silica cement, net ton, bulk, Latrobe	28.50
Silica cement, net ton, bulk, Chicago	25.50
Silica cement, net ton, bulk, Ensley, Ala.	26.50
Silica cement, net ton, bulk, Mt. Union	24.50
Silica cement, net ton, bulk, Utah and Calif.	37.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.	$105.00
Standard chemically bonded, Curtiner, Calif.	115.00
Burned, Balt.	99.00

Magnesite Brick

Standard Baltimore	$131.00
Chemically bonded, Baltimore	116.00

Grain Magnesite

St. ⅜ to ⅛-in. grains

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in: Pa., W. Va., Ohio	$16.75
Midwest	17.00
Missouri Valley	15.00

(Effective Feb. 17, 1958)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	.....	212	193	8.65	9.20
Aliquippa *J3***	173	190	.....	.....	196	8.65	9.325
Atlanta *A8***	175	192	.....	214	198	8.75	9.425
Bartonville *K2***	175	192	178	214	198	8.75	9.425**
Buffalo *W6*	.....	.....	.....	.....	.....	8.65	8.95*
Chicago *N4****	173	190	172	212	196	8.65	9.325
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	8.65	.....
Crawf'dsv. *M4***	175	192	.....	214	198	8.75	9.425
Donora, Pa. *A5*	173	187	.....	212	193	8.65	9.20
Duluth *A5*	173	187	.....	212	193	8.65	9.20
Fairfield, Ala. *T2*	173	187	.....	212	193	8.65	9.20
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	.....	217	198	8.90	9.45
Jacksonville *M4*	184-1	197	.....	219	203	9.00	9.675
Johnstown *B3***	173	190	172	.....	196**	8.65	9.325**
Joliet, Ill. *A5*	173	187	.....	212	193	8.65	9.20
Kokomo *C9**	175	189	.....	214	195*	8.75	9.30*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.60	10.275
Kansas City *S2**	178	192	.....	217	198*	8.90	9.45*
Minnequa *C6*†	178	192	177	217	198†	8.90	9.45†
Monessen *P6*	.....	.....	.....	.....	193	8.65	9.20
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	8.95	9.50*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.60	10.15
Rankin, Pa. *A5*	173	187	.....	.....	193	8.65	9.20
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*‡	.....	.....	.....	236	.....	9.60	10.15†
SparrowsPt. *B3****	175	.....	.....	214	198	8.75	9.425
Sterling, Ill. *N4****	175	192	172	214	198	8.75	9.425
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.30
Worcester *A5*	179	.....	.....	.....	.....	8.95	9.50
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢.
** 11-12¢ zinc.
*** .10¢ zinc.
† Plus zinc extras.
‡ Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Baltimore, Md. *T8*	9.50	10.40	12.60	15.60	18.55
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.85	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	.....	.....
Franklin Park, Ill. *T8*	9.05	10.25	12.45	15.45	18.40
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *J3*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Pittsburgh *S7*	8.95	10.40	12.60	15.60	18.55
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Wallingford *W1*	9.40	10.70	12.90	15.90	18.55
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *J3*	8.95	10.40	12.60	15.60	18.55

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	C.D.	Elec. Weld H.R.
Babcock & Wilcox	2	13	36.34	42.56	35.22
	2½	12	48.94	57.31	47.43
	3	12	56.51	66.18	54.77
	3½	11	65.97	77.25	63.93
	4	10	87.61	102.59	85.53
National Tube	2	13	36.34	42.56	35.22
	2½	12	48.94	57.31	47.43
	3	12	56.51	66.18	54.77
	3½	11	65.97	77.25	63.93
	4	10	87.61	102.59	85.53
Pittsburgh Steel	2	13	36.34	42.56	.....
	2½	12	48.94	57.31	.....
	3	12	56.51	66.18	.....
	3½	11	65.97	77.25	.....
	4	10	87.61	102.59	.....

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Machine and Carriage Bolts	Full Container Price	30 Containers	20,000 Lb.	40,000 Lb.
	Pct. Discounts			
½" and smaller x 6" and shorter	49	54	56	57
⅝" thru 1" x longer than 6"	35	40	43	45
Rolled thread carriage bolts ½" & smaller x 6" and shorter	49	54	56	57
Lag, all diam. x 6" & shorter	49	54	56	57
Lag, all diam. longer than 6 in.	39	44½	47	48½
Plow bolts, ½" and smaller x 6" and shorter	49	54	56	57

(Add 25 pct for broken case quantities)

Nuts, Hex, HP reg. & hvy.	Full case or Keg price
⅝ in. or smaller	60½
⅞ in. to 1 in. inclusive	55½
1⅛ in. to 1½ in. inclusive	58½
1⅝ in. and larger	53½
C. P. Hex, reg. & hvy.	
⅝ in. and smaller	60½
⅞ in. to 1½ in. inclusive	55½
1⅝ in. and larger	53½
Hot Galv. Hex Nuts (All Types)	
⅝ in. and smaller	46½
Semi-finished Hex Nuts	
⅝ in. or smaller	60½
¾ in. to 1½ in. inclusive	55½
1⅝ in. and larger	53½
(Add 25 pct for broken case or keg quantities)	
Finished	
⅜ in. and smaller	63
Rivets	
	Base per 100 lb
½ in. and larger	$12.25
	Pct. Off List
7/16 in. and smaller	19

Cap Screws

	Discount (Packages) *Full Finished H. C. Heat Treat*	
New std. hex head, packaged		
¼" diam. and smaller x 6" and shorter	40	26
¾", ⅞", and 1" diam. x 6" and shorter	22	3
¼" diam. and smaller x longer than 6"	8	+13
⅜", ⅞", and 1" diam. x longer than 6"	+ 6	+32
	C-1018 Steel Full-Finished Cartons Bulk	
¼" through ⅝" dia. x 6" and shorter	58	49
⅜" through 1" dia. x 6" and shorter	45	33

Minimum quantity—¼" through ⅜" diam., 15,000 pieces; 1/16" through ⅝" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.

Machine Screws & Stove Bolts

Plain Finish	Discount Mach. Screws	Stove Bolts
Cartons	19	32
Bulk *Quantity*		
To ¼" diam. incl. — 25,000-200,000	9	54
5/16 to ½" diam. incl. — 25,000-200,000	9	54
All diam. over 3" long — 5,000-100,000	—	54

Machine Screws & Stove Bolt Nuts

	Discount Hex	Square
In Cartons	16	19
Quantity		
In Bulk		
⅜" diam. & smaller — 15,000-100,000	7	9

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.7
Chicago	140.9
San Francisco-L. A.	148.6

Dec. 1955. value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper	
Rolled elliptical, 18 in. or longer, 5000 lb lots	42.00
Electrodeposited	33.25
Brass, 80-20, ball anodes, 2000 lb or more	44.00
Zinc, ball anodes, 2000 lb lots	16.50
(for elliptical add 1¢ per lb)	
Nickel, 99 pct plus, rolled carbon, 5000 lb	1.0225
(Rolled depolarized add 3¢ per lb)	
Cadmium	1.55
Tin, ball anodes $1.13 per lb (approx.).	

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	71.70
Copper sulphate, 100 lb bags, per cwt.	24.35
Nickel salts, single, 100 lb bags	40.50
Nickel chloride, freight allowed, 300 lb	48.50
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	24.05
(Philadelphia price 24.50)	
Zinc cyanide, 100 lb	60.75
Potassium cyanide, 100 lb drum N. Y.	48.00
Chromic acid, flake type, 10,000 lb or more	31.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots for minus 100 mesh

Swedish sponge iron, del. East of Miss. River, ocean bags, 23,000 lb. and over	10.5¢
F.O.B. Riverton or Camden, New Jersey, freight allowed west of Miss. River	9.5¢
Domestic sponge iron, 98+% Fe, 23,000 lb. and over del'd East of Miss. River	10.5¢
F.O.B. Riverton, New Jersey, West of Miss. River	9.5¢
Canadian sponge iron, del'd in East, carloads	10.5¢
Electrolytic iron, annealed, imported 99.5+% Fe	27.5¢
domestic 99.5+% Fe	36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe	57.0¢
Electrolytic iron melting stock, 99.84% pure	27.0¢
Carbonyl iron size 3 to 20 micron, 98%, 99.8+% Fe	88.0¢ to $2.85
Aluminum, freight allowed	38.00¢
Brass, 10 ton lots	31.1¢ to 47.1¢
Copper, electrolytic	41.50¢
Copper, reduced	40.3¢ to 48.8¢
Cadmium, 100-199 lb. 95¢ plus metal value	
Chromium, electrolytic, 99.85% min. Fe. 03 max. Del'd	$5.00
Lead	21.50¢ lb, f.o.b. plant
Manganese f.o.b. Extron, Pa.	46.0¢
Molybdenum, 99%	$3.60 to $3.95
Nickel, chemically precipitated	$1.05
Nickel, unannealed	$1.00
Nickel, annealed	$1.06
Nickel, spherical, unannealed #80	$1.13
Silicon	43.50¢
Solder powder	13¢ plus met. value
Stainless steel, 302	$1.02
Stainless steel, 316	$1.30
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh) $3.75 (nominal)	
Zinc, 5000 lb & over	17.5¢ to 30.7¢

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery† Charge	Sheets: Hot-Rolled (18 ga. & hvr.)	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 6415 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 6815 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		8.59	9.87	10.13	8.64	8.97	9.05	9.01	10.68				
Baltimore	$.10	8.38	8.98	9.71	8.86	8.76	9.29	9.16	11.44*	16.18	15.18	19.73	18.98
Birmingham	.15	8.18	9.45	10.15	8.23	8.56	8.64	8.60	10.57				
Boston	.10	9.48	10.54	11.55	9.52	9.82	9.73	9.83	13.00	15.79	15.38	19.89	19.18
Buffalo	.15	8.40	9.15	11.22	8.65	9.05	9.05	8.95	11.05*	16.34	15.15	19.01	18.95
Chicago	.15	8.35	9.60	10.15	8.38	8.71	8.79	8.75	8.95	15.80	14.80	19.35	18.60
Cincinnati	.15	8.49	9.65	10.20	8.69	9.08	9.33	9.07	9.46	15.61	15.11	18.96	18.91
Cleveland	.15	8.33	9.60	10.10	8.48	8.84	9.16	8.84	10.95*	15.80	14.89	19.44	18.96
Denver	.20	9.70	11.30	12.40	9.80	9.70	9.80	9.98	10.65				17.60
Detroit	.15	8.58	9.85	10.50	8.73	9.06	9.33	9.05	9.30	15.46	15.06	18.81	18.86
Houston		7.45	8.75		7.60	8.05	7.60	7.55	11.10	16.20		19.30	19.05
Kansas City	.20	9.02	10.27	10.07	9.05	9.38	9.46	9.42	9.87	20.02	15.47	20.02	19.27
Los Angeles	.10	8.60**	10.85	11.75	8.65	8.65	8.70	8.80	13.35*	17.05	16.10	21.05	20.35
Memphis	.15	8.55	9.80		8.60	8.93	9.01	8.97	12,11*				
Milwaukee	.15	8.48	9.73	10.28	8.51	8.84	9.00	8.88	9.18	15.43	14.93	18.78	18.73
New York	.10	8.97	10.23	10.66	9.41	9.53	9.45	9.67	12.86*	15.82	15.19	18.42	18.99
Norfolk	.20	8.80			8.60	8.35	8.70	8.45	10.70				
Philadelphia	.10	8.10	9.00	9.97	8.79	8.87	8.60	8.75	11.61*	15.61	15.11	18.96	18.91
Pittsburgh	.15	8.33	9.60	10.50	8.48	8.71	8.79	8.75	10.95*	15.80	14.80	19.35	18.60
Portland		8.50	11.20	11.55	9.05	8.30‡	8.65	8.65	14.50	18.50	16.10	20.75	20.25
San Francisco	.10	9.45	10.85	11.10	9.55	9.70	9.60	9.80	13.10	17.05	16.10	21.05	20.35
Seattle		9.95	11.15	12.00	10.00	9.70	9.80	10.80	14.05	16.55	16.35	20.65	20.15
Spokane	.15	10.10	11.30	12.15	10.15	9.85	9.95	10.25	14.20		17.35	21.55	21.05
St. Louis	.15	8.69	9.94	10.51	8.74	9.08	9.25	9.12	9.56	15.66	15.16	19.01	18.96
St. Paul	.15	8.94	10.19	10.76	8.99	9.45	9.53	9.37	9.81		15.26		19.06

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** All sizes except 18 and 16 gage.
†† 10¢ zinc. ‡ Deduct for country delivery. † 3/16 in. to ½ in. * C1018—1 in. rounds.

(Effective Feb. 17, 1958)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	.....
Birmingham *R3*	62.00	62.50*	.....	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	.....
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	66.50	67.00	67.50	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50	.....	.....
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Menessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Sharpsville *S3*	66.00	66.50	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	.....
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	74.00
Youngstown *Y1*	.....	.....	66.50	67.00	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.60 pct phos.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4* (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $103.50; (15.51-16.00), $106.50. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 18 pct. Add $1.25 for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under .10 pct phos.); $64.00. Add $1.00 premium for all grades silvery to 18 pct.

† Intermediate low phos.

STAINLESS STEEL

Base price cents per lb f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.00	23.75	23.25	25.25	—	27.00	39.75	32.25	37.00	—	16.75	—	17.00
Slabs, billets	27.00	27.00	28.00	31.50	32.00	33.25	49.50	40.00	46.50	—	21.50	—	21.75
Billets, forging	—	36.50	37.25	38.00	41.00	40.50	62.25	47.00	55.75	32.00	28.25	28.75	28.75
Bars, struct.	42.00	43.00	44.25	45.00	48.00	47.75	73.00	55.50	64.75	37.75	33.75	34.25	34.25
Plates	44.25	45.00	46.25	47.25	50.00	50.75	76.75	59.75	69.75	40.25	35.00	36.75	36.00
Sheets	48.50	49.25	51.25	52.00	—	55.00	80.75	65.50	79.25	48.25	40.25	—	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	44.25	69.25	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	—	55.00	80.75	65.50	79.25	48.25	40.25	—	40.75
Wire CF; Rnd HR	40.00	40.75	42.00	42.75	45.50	45.25	69.25	52.50-52.75	61.50	35.75	32.00	32.50	32.50

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; Vandergrift, Pa., *U1*; Washington, Pa., *W2*, *J2*, Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*.

Strip: Midland, Pa., *C11*; Waukegan, Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A3*; Bridgeville, Pa., *U2*; Detroit, *M2*; Canton-Massillon, O., *R3*; Harrison, N. J., *D3*; Youngstown, *J3*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (plus further conversion extras); *W1*; New Bedford, Mass. (.25¢ per lb higher), *R6*; Gary, *U1* (.25¢ per lb higher).

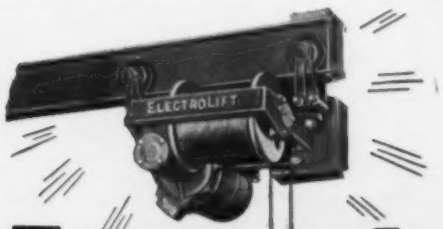
Bar: Baltimore, *A7*; S. Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R5*, S. Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*, *R3*; Ft. Wayne, *I4*; Detroit, *R5*; Gary, *U1*; Owenboro, Ky., *G5*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*.
Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*; S. Chicago, *U1*.

Plates: Brackenridge, Pa., *A3*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa. *C11*; New Castle, Ind., *I2*; Middletown; *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*; Vandergrift, Pa., *U1*; Gary, *U1*.

Forging billets: Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R5*; Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*; Detroit, *R5*; Munhall, Pa., S. Chicago, *U1*; Owenboro, Ky., *G5*.

(Effective Feb. 17, 1958)



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WORM DRIVE ELECTROLIFT HOISTS

5844

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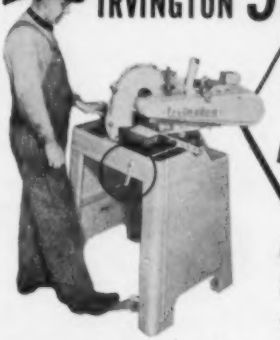
New! Different!

IRVINGTON 58 CUT-DOWN SAW

ENGINEERED with FEATURES Demanded By the METAL INDUSTRY!



Now—make straight cuts, mitres or compound angle cuts with absolute precision. Ruggedly built for long life, hairline accuracy.

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Grand Rapids 5, Michigan
Phone: GLendale 1-0184

FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	38.00
0.05% C....	39.00	1.00% C....	37.75
0.10% C....	38.50	1.50% C....	37.50
0.20% C....	38.25	2.00% C....	37.25

4.00-4.50% C, 60-70% Cr, 1-2% Si.. 28.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 27.50
0.025% C (Simplex) 36.75
7-8½% max C, 50-55% Cr, 3-6% max Si 25.00
7-8½% max C, 50-55% Cr, 3% max Si 25.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Per lb chromium, contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C $1.31
0.50% max. C 1.31
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.40

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads $1.29
Ton lots 1.31
Less ton lots 1.33

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in. x down, packed.

Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads	27.50	14.20
Ton lots	32.75	15.65
Less ton lots	34.35	17.30

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads 25.65
Ton lots 27.95
Less ton lots 29.45

Calcium-Manganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads 24.25
Ton lots 26.15
Less ton lots 27.15

5MZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots 17.20
Ton lots 18.70
Less ton lots 19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed 18.50
Ton lots to carload packed 19.65
Less ton lots 20.90

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	12.25
Johnstown, Pa.	12.25
Neville Island, Pa.	12.25
Sheridan, Pa.	12.25
Philo, Ohio	12.25
S. Duquesne	12.25

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk 14.80
Ton lots packed 17.20

Spiegeleisen

Per gross ton, lump, f.o.b. Palmerton, Pa., and Neville Island, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$100.50
19 to 21%	3% max.	102.50
21 to 23%	3% max.	105.00

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads 34.00
Ton lots 36.00
250 to 1999 lb 38.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 25.50

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	33.60	36.40	37.60
0.30% max. C	32.10	34.90	36.10
0.50% max. C	31.60	34.40	35.60
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	28.60	31.40	32.60

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carloads bulk 12.80
Ton lots, packed 14.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet 15.10
Ton lots, packed, pallets 16.50

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots, packed	Carloads, packed
96.75% Si, 1.25% Fe..	24.20	22.90
98% Si, 0.75% Fe	24.95	23.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk 7.70
Ton lots, packed 10.50

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.20	75% Si....	16.40
65% Si....	15.25	85% Si....	18.10
	90% Si....	19.50	

Ferrovanadium

50-55% V delivered, per pound, contained V, carloads, packed.

Openhearth 3.20
Crucible 3.30
High speed steel (Primos) 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots..	2.40	3.30	4.55

(Effective Feb. 17, 1958)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads ..... 10.65¢
Ton lots ..... 11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.28

Ferrocolumbium, 50-50%, 2 in. x D, delivered per pound contained Cb.

Ton lots $4.90
Less ton lots 4.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Sb plus Ta $4.25

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.68

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton $90.00
10 tons to less carload $110.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $240.00

Ferrotungsten, ¼ x down packed, per pounds contained W, ton lots delivered ..... $2.60 (nominal)

Molybdic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa. $1.41
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium, per lb of alloy

35-40% f.o.b. freight allowed, carloads, packed ..... 27.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Boronil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload $5.50

Bortram, f.o.b. Niagara Falls.

Ton lots per pound ..... 45¢
Less ton lots, per pound ..... 50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.

Ton lots per pound ..... 14.00¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.. $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Bridgeville, Pa., freight, allowed, 100 lb and over

No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots $1.46
Less ton lots 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

GET THE MOST a ferrochromium alloy can offer with EXLO®. . . high chromium-carbon ratio · controlled low silicon content · high density · exceptional cleanliness · extra low carbon content (.025% and .05% max. grades).

Call your nearest Vanadium Corporation Office for more facts about how EXLO improves the quality of low-carbon stainless and heat-resisting steels and irons!

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RAILWAY EQUIPMENT
FOR SALE
Used - As Is - Reconditioned
RAILWAY CARS
All Types
SERVICE-TESTED
FREIGHT CAR REPAIR PARTS
For All Types of Cars
LOCOMOTIVES
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Diesel-Electric

SPECIAL
STANDARD GAUGE CARS
COVERED HOPPER CARS
10—70 Ton Capacity
ORE HOPPER CARS
660 Cubic Feet
40- and 50-Ton Capacity
SIDE DUMP CARS
5—Air-operated, 30-Cubic Yard, Drop Door, Austin-Western

RAILWAY TANK CARS and STORAGE TANKS
6,000- 8,000- and 10,000-Gallon
Cleaned and Tested
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Phone: Mitchell 4-1212
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New York 7, N. Y.
Phone: BEekman 3-8230
"ANYTHING containing IRON or STEEL"

GUARANTEED **RE-NU-BILT**
ELECTRIC POWER EQUIPMENT
DC MOTORS

Qu.	H.P.	Make	Type	Volts	RPM
1	3000	Elliott		475	520
1	2250	Elliott		600	200/300
1	2200	G.E.	MCF	600	400/570
1	1750	Elliott		250	175/250
1	1375	G.E.	MCF	415	1300
1	1200	G.E.	MCF	600	450/600
1	940	Whse.	QM	250	140/178
3	800	G.E.	MCF	250	400/750
2	450	Whse.		550	415
2	300	G.E.	MPC	230	400
2	200	Whse.	CB-207.4	250	850/1200
2	125	Whse.	SK-190	230	450/1200
1	150	G.E.	CDBB	600	250/700
1	150	Cr. Wh.	65-H	250	1150
1	125	Whse.	SK-185	230	350/1050
2	100	Whse.	SK-181	230	450/1000
1	75	G.E.	CD-1281	230	850
1	50	G.E.	MD-412-AE	230	550
6	40	Rel.BB	885FTEFC	230	500/1500
1	1500	Whse.		525	600
3	750	G.E.	MCF	600	450/900
1	750	G.E.	MCF	600	300/720
1	750	G.E.	MCF	600	120/360

MG SETS—3 Ph. 60 Cy.

Qu.	K.W.	Make	RPM	DC Volts	AC Volts
1	2000	G.E.	514	600	2300/4600
2	1750/2100	G.E.	514	250/300	2500/4600
1	1500	G.E.	600	600	4160/2300
2	1000	G.E.	720	600	6600/13200
1	750	G.E.	720	125/250	2300/4600
1	500	Whse.	900	125/250	440
1	500	G.E.	900	125/250	440/2300
1	350	G.E.	900	125	4160/2300/440
2	300	G.E.	1200	250	2300
1	250	Whse.	1200	575	2300
1	200	Whse.	1200	250	2300
1	200	G.E.	1200	250	440

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
3	3333	Whse.	OISC	1	13800 x 2300
1	1500	G.E. auto	HT	3	4000/4200/4400
3	1000	G.E.	HVDDJ	1	2400 x 480
3	1000	G.E.	OA/FA	1	13800 x 230/460
2	750	G.E.	Pyranol	1	4800 x 83/55
3	500	Kuhl	OISC	1	13200 x 6800
3	500	Moloney	OISC	1	6600/11430Y x 2300/4000Y
1	225	Marcus	Auto-air	3	208/220
Unused					
3	150	G.E.		1	23000x2300/4000V
2	100	Whse.	OISC	1	2400/2300 x 460/230/115
3	100	G.E.	OISC	1	22900x2400/4160Y
Unused					

BELYEA COMPANY, INC.
47 Howell Street, Jersey City 6, N. J.

Mild Pickup Welcome At New York

Used machinery business there has been better than expected.

Some sales long pending are finally being closed.

Subcontractors sharing in new aircraft contracts are also interested in buying.

▪ New York used machinery dealers are far from condemning 1958 on the strength of business so far.

While the market there is hardly robust, it is showing more life than at the end of 1957. December closed on a low level of activity and pessimism was strong among the dealers. However some of them are now experiencing a quickening in the sales tempo. And they believe it will grow stronger as the year progresses.

Some Buyers Off Fence—Recent sales have often fallen into the "at last" category. Customers who have been fence-sitting for some months finally decided to buy. Dealers believe there are two major factors responsible. First, buyers found they had more money on hand when they finally closed books for 1957 than a poor fourth quarter had indicated. Second, new metalworking business is coming into the area's economy.

A prime example are local aircraft makers. Several firms in the area received substantial government contracts (some on a more or less distress basis) late in 1957. The new business is now reaching subcontractors, who are again coming into the machinery market.

Pickup Moderate—But the market is not bounding ahead. The pickup has been very moderate, although dealers are cheered by the fact that there has been any pickup at all. And several believe that the increase will continue to gather momentum. Inquiries continue to come in at a reasonably good rate, and prices with a few exceptions, are holding up.

Late Models Wanted—What demand there is continues to be for late-model tools of good quality. Older tools appear almost impossible to sell in the domestic market regardless of condition. Some dealers note special interest in fabricating equipment, such as shears, ironworkers, press brakes and bending rolls. But others say sales are general, not emphasizing any one category. All agree, however, that customers are fussy. It must be the right tool, or there's no sale.

This is not too much of a problem for most dealers as stocks are generally good. Auctions in recent months have produced a good selection for the market. If the upturn continues and grows, dealers can look forward to a brisker turnover.

Auction on the Way

Toolroom, production, and stamping machinery will be featured at an auction scheduled for Feb. 25 at the Yale and Towne Mfg. Co. plant in Stamford, Conn.

Among equipment offered for sale will be 60 automatic screw machines, turret lathes, milling machines, a 400-ton transfer press, a new trimming press, and various plating department machinery.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDING ROLLS
8' x ¾" Bertsch Initial Type
10' x 10" Ga. Bertsch Initial Type
10' x ½" King Pyramid Type
18' x 1" Niles Pyramid Type

BORING MILL—HORIZONTAL
Cincinnati Gilbert Model J—4½" Dia. Spindle, 36" Travel, 38" x 34" Table—NEW 1956

BRAKE—PRESS TYPE
10' x ¼" & 12' x ⅛" Hydraulic—NEW

BUILDING 120' x 420' New Steel Frame—Unerected

CRANES—OVERHEAD ELECTRIC TRAVELING

3 ton P&H	56' Span	220/3/60
5 ton P&H	50' Span	115 Volt D.C.
5 ton Cleveland	60' Span	110 Volt D.C.
5 ton Shepard Niles	70' Span	230 Volt D.C.
8 ton P&H	85' Span	220/3/60
10 ton Shepard Niles	38' Span	440/3/60
10 ton Shaw	48' Span	230 Volt D.C.
10 ton Shaw	130' Span	230 Volt D.C.
15 ton Shepard Niles	52' Span	230 Volt D.C.
20 ton Shaw	28' Span	230 Volt D.C.
50 ton Northern	52' Span	440/3/25 A.C.
120 ton P&H	66' Span	220/3/60 A.C.
120 ton Shepard Niles	77' Span	220/3/60

CRANE GIRDERS
10 ton Capacity 77' 2" Span—No Motors

DRAW BENCHES
8,000# Waterbury Farrel Single Draw 20 Ft. Length of Draw
10,000# Aetna Standard Single Draw 44 Ft. Length of Draw

FORGING MACHINES
1" to 5" Acme, Ajax, National

FURNACE—MELTING
15 ton Heroult Top Charge, 12' Shell Complete with Transformers

HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING 800 lb. to 12,000 lb. incl.

HEADERS
#250C Manville Solid Die Single Stroke
#44 Waterbury Farrel DSOD Capy. ⅝" x 6"

LEVELERS—ROLLER
32" Torrington, 19 Rolls 131/32", dia.
28" Voss Chain Leveler, Capacity .025 to .075

PRESSES—HYDRAULIC
500 ton Watson Stillman 4 Col. Piercing Press
600 ton HPM Fastraverse, Bed 36" x 36"
600 ton Elmes, 36" Stroke, 48 x 45" Bet. Cols.
1500 ton Bliss 15" Stroke, Bed 49" x 48"
1500 ton Mesta Steam Hydr. Forging Press
4500 Baldwin-Lima-Hamilton Hydr. Forging Press

PRESS—KNUCKLE JOINT
600 ton Bliss No. 25, 2½" Stroke. Bed 24 x 29"

PRESSES—STRAIGHT SIDE
180 ton Hamilton #847, 12" Str. 35½" Bet. Ups.
200 ton Clearing F1200-42, Stroke 30", Bed 44"x38"
250 ton Bliss SI 7½ Str. Blstr. 33" x 39"

PUNCH & SHEAR COMBINATIONS
Cleveland Style C, Arch. Jaw, Capy. ⅝" x ⅝"
Cleveland Style EF, Arch. Jaw, Capy. 1⅛" x 1"
Cleveland Style G Single End, 60" Throat
Cleveland Style W, 60" Throat, Architectural Jaw

TORRINGTON FLAT WIRE MILL LINE
Two Stand Two High 6" x 5", Comp. with Acc.

ROLLING MILLS
8" x 10" Single Stand Two High
10" x 14" Single Stand Two High
10" x 16" Single Stand Two High
12" x 12" Single Stand Two High
12" x 16" Single Stand Two High
16" x 34" Single Stand Two High
20" x 36" Single Stand Two High

ROLLS—FORMING
6 Stand Yoder M-1½
14 Stand Yoder, 2¾" Shaft, 20" Bet. Housings
18 Stand Custom Built, 2¾" Shaft, will take 36" wide
14 Stand Custom Built, 1⅞" Shaft x 14 3/16"

ROLLS—PLATE STRAIGHTENING
108" Bertsch, Seven Rolls 9" Dia.
72" Niles, 7 Rolls 9" Dia. Motor Driven

SHEAR—ALLIGATOR
No. 4 Mesta RH LK. Capacity 2" x 12"

SHEAR—GATE
12' x ⅜" Niagara Model 1212, NEW 1951

SHEAR LINES
36" x .020 Ga. Hallden Shear Line
42" Bliss Up-Cut Shear, Capacity .125" Max. With Hump & Run-out Tables

SHEARS—SQUARING
10' x ¼" Cincinnati #1810
10' x ⅜" Niagara No. 910

SHEAR—ANGLE
6 x 6 x ⅝" Hilles & Jones

SLITTER
36" Wean Slitting Line

STRAIGHTENERS
24" Hallden Straightening & Cutting Machine
No. 3 Medart 3 Roll, Capacity to 4½" Tubing
Torrington 12-Roll Capy. 1⅛" Hex., Sq., Etc.
No. OA Medart 2-Roll, Capacity ⅛" to 1" Bars
No. O Medart 2 rolls, Capacity to 1¼" dia. Bars

SWAGING MACHINE
#6½A Fenn Capacity 3⅛" Tube. 1¼" Solid, 10" Die Length Hydraulic Feed, LATE

TUBE REDUCER
Standard 1½" Tube Reducing Machine Complete with Elect. Equip.

WIRE DRAWING MACHINES
Type B Morgan 4-Block, Capy. #5 Rod down
No. 3 Vaughn 12-Die Continuous, Capy. #14 to #27

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Equipment •

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Consulting Engineering Service
Surplus Mfg. Equipment Inventories Purchased

MILES FOR VALUES

New Stock Catalog Available

96" Model 420 Barnes deep hole drill, 2 spindle
180 ton No. 27 Williams and White bulldozer
6" capacity No. 401 Campbell "Cutamatic" abrasive cut-off
2850 CFM Worthington 650 HP synchronous motor electric drive compressor
20" swing No. 217 Baker Brothers box column heavy duty upright drill
4' arm 9" column Cincinnati Bickford super service radial
24" Cincinnati 4 spindle upright drill, spindle motor drive
No. 15½ Foote Burt vertical hydraulic feed driver for a multiple head (2)
20" x 72" Landis type D heavy duty plain hydraulic cylindrical grinder
53" No. 24A Gardner vertical spindle horizontal disc grinder, 15 HP, multiple vee belt dr.
8" x 24" No. 35 Abrasive grinder
300 lb. No. 3C Chambersburg pneumatic forging hammer
28 Nazel forging hammer
4" bar Universal "Tri-Way" horizontal boring, milling and drilling machine
30" x 30" x 8' Cincinnati Hypro two rail, one right hand side head, dial feed planer
400 ton No. 664 Toledo tierod frame knuckle joint coining press
600 ton Elmes cast steel high speed downward acting hydraulic press
500 ton Baldwin Southwark high speed hydraulic vertical downward working press
800 ton Model 2E48-800 Hamilton straight side single crank air clutch press
750 ton No. 3 National all steel Maxipress
96" x ½" capacity Beatty No. 29 power squaring shear, late

Ask for latest stock list

MILES MACHINERY CO.
PHONE SAGINAW PL 2-3105
2041 E GENESEE AVE SAGINAW, MICH

2000# Chambersburg Pneumatic Forging Hammer, Late Type, Serial 20CH392L7.
2500 lb. Model E Chambersburg Steam Drop Hammer, New 1944
6½" Square Capacity Alligator Shear; clutch operated; United Engineering & Foundry
WHEELABRATOR, American; 36" x 42", skip loader hoist; dust arrester
Lindberg Endothermic Atmospheric Generator; 750 CFH, output 2200 deg. F.
Bliss Trimming Presses, Tie Rod Construction Side Shears, Capacities 113, 150, 190 tons
3—2-ton Denison Auto. Hopper Feed & Index Table Hydr. Multipress
6' x 10 ga. Cincinnati Squaring Shear, ¼" x 8' Pexto Gate Shear, 20" throat
Late Upsetting & Forging Machines with air clutch, 4" National, 2½" Ajax, 4" Ajax, 5" Ajax
Williams White Bulldozers from 5-ton to 350-ton
Landis Landmaco and other Landis Threading Machines
Single & Double End Punches
No. 3 Motch & Merryweather Saw, with Saw Grinder
No. 3 Waterbury Farrel Progressive Header. Cap. ½"; 4 stations and 1 Cutoff
Ajax Forging Presses #5-C 500-ton, #7-C 700-ton

BOLT, NUT AND RIVET MACHINERY, COLD HEADERS, THREAD ROLLERS, THREADING MACHINES, TAPPERS, COLD BOLT TRIMMERS, SLOTTERS, HOT HEADERS AND TRIMMERS, COLD AND HOT PUNCH NUT MACHINES.

DONAHUE STEEL PRODUCTS CO.
1919 W. 74th Street, Chicago 36, Ill.

REBUILT — GUARANTEED ELECTRICAL EQUIPMENT

MOTOR GENERATOR SETS

Qu.	K.W.	Make	R.P.M.	Volts D.C.	Volts A.C.
3*	3500	Al.Ch.	514	250/700	13800/6900/4160
1*	2500	Al.Ch.	720	600	4160/2400
1	1250	G.E.	133/265	450	4160
1	1250	Whse.	600	720	4000/2300
1	1000	Whse.	125/250	720	4000/2300
1	600	Whse.	125/250	1200	440
1	500	Cr.Wh.	575/600	720	2300
1	500	G.E.	280/300	900	2300
1	500	Al.Ch.	250	600	2300
1*	300	Al.Ch.	250/300	1200	2300
3	300	Whse.	125/250	1200	4000/2300
2	200	Whse.	125/250	1200	2300
1	150	G.E.	250	1200	4000/2300
1	150	Whse.	250	1200	2300/440

* 3-units sets

Complete G.E. Outdoor Switchgear consisting of 7 watertight cubicles. (5) contain type AM, 1200 amps., 5-KV magnetic drawout 3-pole air circuit breakers. 100,000-KV int. cap. (2) contain metering equipment, batteries, etc. BARGAIN IF WE CAN SHIP DIRECT FROM PRESENT LOCATION.

DIRECT CURRENT MOTORS 230-Volt

Qu.	HP	Make	Type	R.P.M.
1*	3000	G.E.	F. Vent.	250/360
1**	1500	Whse.	F. Vent	600
1**	800	Whse.	F. Vent.	143/168
1	700	Whse.	F. Vent.	300/700
1	600	Whse.	Mill-R.B.	110/250
2**	600	Al.Ch.	Mill	300/600
1	400	G.E.	Ped. Brg.	450
1	300	Whse.	Mill	300
2	275	Whse.	Mill-QM	425/850
1	180	G.E.	MPC	400
1	175	G.E.	CD-175-A	850/1025
1	125	G.E.	MPC	400
1	125	Whse.	SK-184	575/850
1	100	G.E.	CD-175	400/800
1	100	Rel.	461-T	1150/1500
1	80	El.Dy.	25-S	525/1050
1	80	Rel.	651-T	575/1150
1	50/60	Whse.	SK-131	500/1500
1	50	G.E.	Encl. F.C.	400/800
2	40/30	Whse.	T.E.F.C.	580/1500

* 300/600-Volt
** 600-Volt

T. B. MAC CABE COMPANY
4302 Clarissa St., Philadelphia 40, Penna.
Cable Address — Phone
"Macsteel" Philadelphia, Pa. — Davenport 4-8300

BENKART STEEL & SUPPLY COMPANY

CORAOPOLIS, PENNSYLVANIA
ATlantic 4-1250

Dealers in new and used OET Cranes and Structural Steel Buildings.
Send us your inquiries.

BENNETT MACHINERY CO.

800 TON MILES WHEEL PRESSES
(2) Late Type 800 ton Wheel Presses, 96" between bars; max. dist. ram and resistance head 93" wgt. each 65,000 lbs.
(1) 32" Ohio Dreadnought Shaper, M.D.

375 Allwood Rd., Clifton, New Jersey

No. ½, 1½ Buffalo Forge Univ. Ironworkers, Coper, Notcher.
6' x ¼" Lown Initial Type Bending Roll, M.D.

FALK MACHINERY COMPANY

16 Ward St. Baker 5-5887 Rochester 5, N. Y.

1—AUTOMATIC COOLING BED FOR BARS up to 2" dia., consists of run-in table, cascade section, shuffle bar section, runout table, with all electrics, 200 ft. long.
1—28" x 48" HOT STRIP MILL, 2-high, reversing with 2500 HP D.C. motor, etc.
2—28" 3-HIGH ROLL STANDS with inlet, outlet and intermediate tables. Will produce 4" sq. billets from 8" sq. blooms in 8 passes, includes bloom shear.
1—28" REVERSING BREAKDOWN MILL.
1—25" & 42" x 60" HOT STRIP MILL, 4-high.
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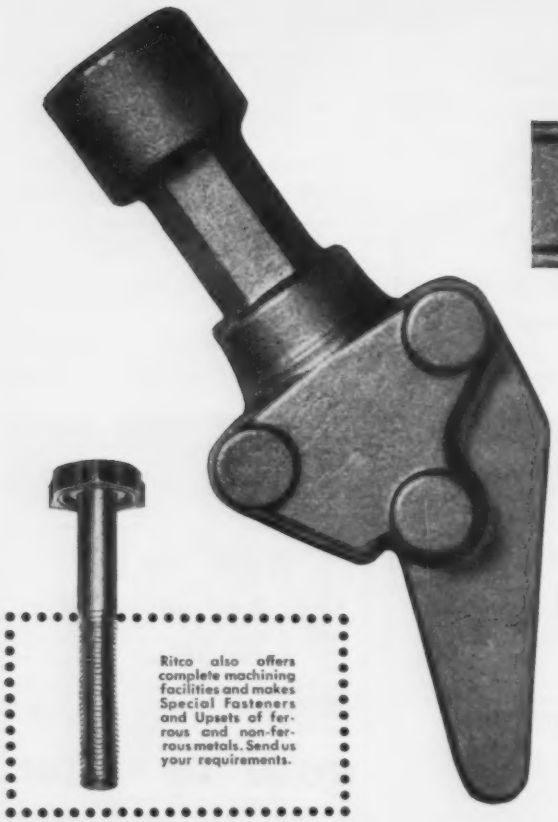

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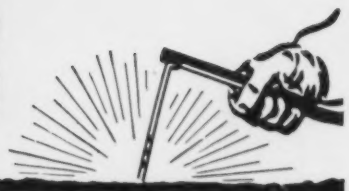

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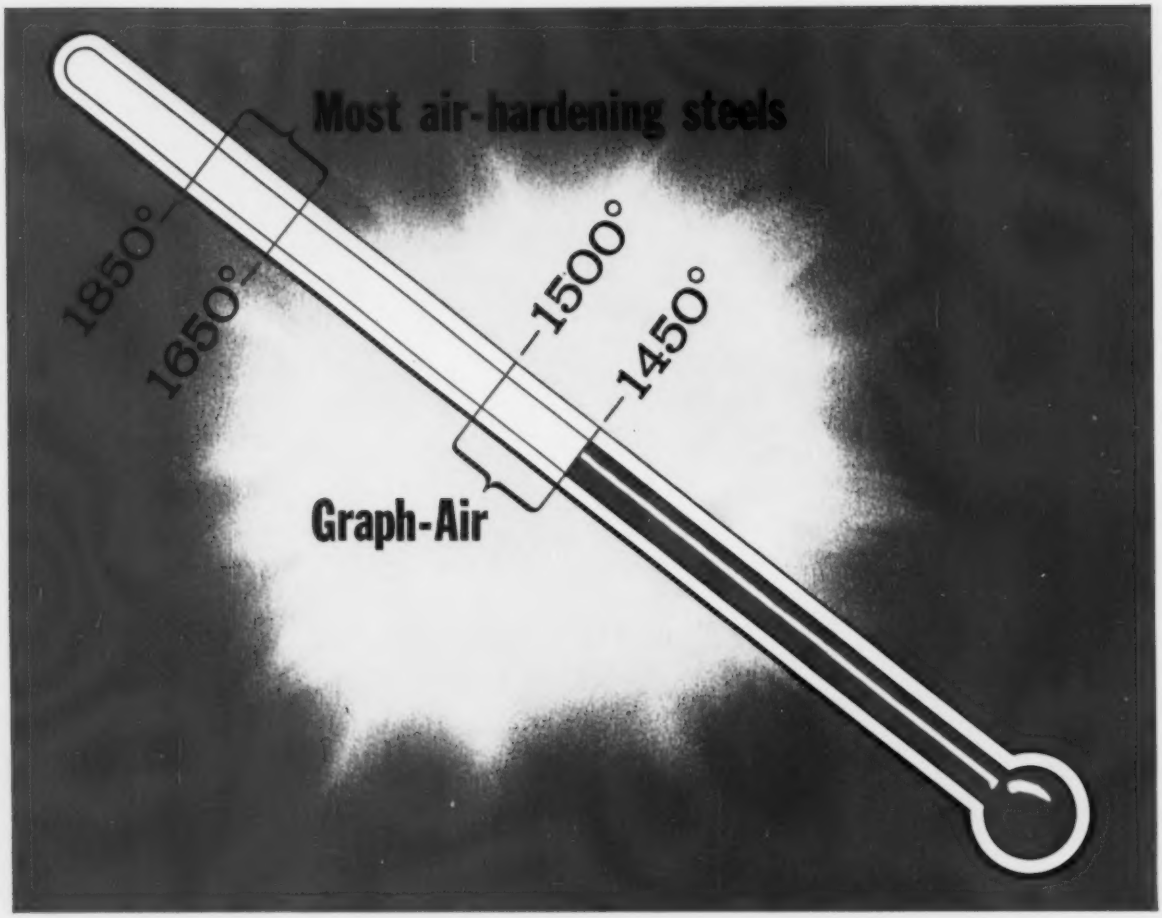

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